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State Journal of Medicine

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M. D. - D. O. Relations

The professional relationship of doctors of medicine to doctors of osteopathy has been made, in effect, a matter of local option at state levels, as a result of the action in June of the House of Delegates of the American Medical Association. The AMA advised the individual state organizations that M.D.'s should evaluate D.O.'s by the same criteria used to determine the scientific, ethical, and professional competence of regular practitioners of medicine.

Much study and discussion on the relations of the two groups have been underway, especially for the past six years. A special liaison committee from the American Medical Association and the American Osteopathic Association did not succeed in producing a mutually satisfactory statement. Accordingly, the Judicial Council made a comprehensive report to the AMA House in New York City.

Mentioned were specific problems posed in the American Hospital Association and the Joint Commission on Accreditation of Hospitals. Observation was made that many osteopaths, particularly the graduates of recent years, apparently in sincerity seek adequate medical training to practice scientific medicine and to maintain principles of ethics comparable to those of AMA doctors. Original osteopathy, a system of healing based on principles not substantiated by scientific evidence, is regarded by many as having evolved into osteopathic medicine, comparable to the regular practice of medicine.

The AMA made it clear that it still considers original osteopathy a cult system of healing, and consequently all voluntary professional associations with D.O.'s who persist in espousing original osteopathic

principles are unethical. In effect, the recent pronouncement says that it is possible for an individual osteopath or a group of osteopaths to make it clear that they no longer follow the teachings of the originator of osteopathy, but now sincerely try to practice scientific medicine, with high ethical principles. It now will be possible for a state medical association to determine for itself the proper relationship with such practitioners of osteopathic medicine.

An interesting pattern has been set in California where 2,100 of the 2,300 members of the original California Osteopathic Association initiated and carried to successful conclusion negotiations with the California Medical Association. In that state, osteopaths voluntarily may seek to become regular M.D.'s, eligible for membership in the California Medical Association. The Los Angeles College of Osteopathy is destined to become a regular medical school. Its charter allows it to grant M.D. degrees, and provision is being made for doctors of osteopathy to qualify for M.D. degrees from that institution.

It is clear that the regular medical profession is making no attempt to induce osteopaths to come into regular medicine. Also, according to newspaper accounts, the American Osteopathic Association opposes amalgamation. Nevertheless, where the initiative is taken by the osteopaths, amalgamation will be possible.

The problem varies in different states. It is significant that the Texas Medical Association can continue to decide for itself the proper relationship with osteopaths and be assured that the decision cannot run counter to AMA policy.

MILFORD O. ROUSE, M.D.
Dallas, Texas

An Eye Opener

According to Dr. William B. McCunniff, the average person will drive 33 miles with his eyes shut during a 10 hour drive at 40 miles per hour. This is possible, says Dr. McCunniff, because the average person blinks about 25 times per minute, keeping the eyes shut about two-tenths of a second during each blink.

In Washington: The Texas Stand

"We want no part of it."

That in essence is what Dr. Harvey Renger, President of Texas Medical Association, told members of the House of Representatives Committee on Ways and Means in a recent Washington appearance. His subject, of course, was the King-Anderson bill.

Accompanied by a small delegation from the Association, Dr. Renger appeared August 2 before the Congressmen to alert them that Texas physicians cannot condone any form of socialized medicine.

Indeed, Dr. Renger's appearance stood for two things: the confidence Texas physicians have in present medical care programs and their readiness to battle any encroachment by the socialized medicine forces.

A federally controlled program such as the King bill financed through the Social Security System would result in poorer medical care than is now available in the United States. It would provide health benefits for millions who are not needy and who can afford to pay for their own care. From the Texas angle, it would overcrowd hospitals and nursing homes, and it would be a tremendous blow to the insurance carriers in Texas and to the extension of voluntary health insurance. It would also mean an increase in Social Security taxes for Texas employers, and further reduction of take-home pay for their employees.

"As we view it," Dr. Renger declared, "H. R. 4222 should be recognized for what it actually is—a proposal for a program of socialized medicine for the aged. By common definition, socialized medicine is a system of compulsory health care which is administered, financed, and controlled by the federal government for that segment of the population it serves. *Texas physicians want no part of socialized medicine,* and we respectfully call your attention to the compelling findings of recent

history. In those countries where socialized medicine has been adopted and free enterprise displaced, the quality of medical care has deteriorated and costs have increased immeasurably beyond all estimates."

Recent authoritative surveys in Texas have indicated several facts concerning the status of Texans' ability to pay for their own medical care:

Of 745,000 Texans aged 65 or older, an estimated 175,000 (24 per cent) are gainfully employed and others are spouses of working mates. Another 73,000 individuals receive income from private retirement or pension plans. About one-third of our aged, or 245,000, receive income from dividends, interest, rent, and other sources. Ten per cent of the aged Texans are assisted financially by children and relatives. More than 406,000 aged persons already receive payments from the Old Age Survivors and Dependents Insurance program and 221,000 qualify for Old Age Assistance benefit payments. Other governmental resources include veterans' pensions or veterans' compensation, 49,000; railroad retirement, 22,600; retirement from Federal Civil Service Commission, 9,000; general assistance programs, 8,400; and other state and local programs, 6,700. In addition, it has been noted that 70 per cent of the aged either own their own homes or have an equity in them.

During 1959, aged Texans incurred a median expenditure of $260 for all medical care services. A survey of patients aged 65 or older discharged from All Saints Hospital in Fort Worth reveals that the mean average hospital bill there was $384. Total charges by physicians for those illnesses amounted to a mean average of $115. Thus, the mean hospital bill and physician fees totaled $499.

Physicians report that nearly 30 per cent of aged individuals call upon voluntary health insurance to pay for their own bills, whereas 29 per cent pay for services through current income or savings. Almost 16 per cent of medical bills incurred by the aged are paid for by the family while governmental agencies pick up about 6 per cent of the costs. In about 12 per cent of the cases, the physician renders his professional services without charge. Charges are reduced by the physicians in another 23 per cent of the cases.

Dr. Renger cited the record of Blue Cross-Blue Shield of Texas and non-profit insurance companies in Texas and their efforts to provide voluntary health insurance. In October, 1959, Blue Cross conducted a one-month campaign to enroll the aged. Since that time, it has asked physicians to suggest names of elderly patients who might be interested in coverage. Now, 164 commercial companies make available their health insurance policies to Texas residents who are 65 years of age or older. Through these recent efforts, an estimated 150,000 to 160,000 aged Texans now have prepaid health insurance.

TMA's Committee on Health Insurance will encourage younger individuals who are gainfully employed to purchase health insurance which will carry over beyond age 65, either on a paid-up basis or by permitting individuals to continue coverage following their retirement.

In addition, Dr. Renger told the Ways and Means Committee, medical care for the aged who cannot afford voluntary health insurance and who need help in financing their medical needs will be facilitated by the implementation of the Kerr-Mills Law. During the 1961 regular session, the Texas Legislature passed enabling legislation for the establishment of the vendor's medical care program. An appropriation of $13,600,000 in state funds will be matched by federal funds on a three to one ratio. The bill permits the program to be administered by the State Department of Public Welfare, by direct payments to vendors of medical services, or through a plan of voluntary, prepayment health insurance.

"As evidence of our confidence in the American traditions of free enterprise," Dr. Renger told the Congressmen, "we feel that this program can best be administered by utilizing the

mechanism of voluntary health insurance. Available funds can be used to purchase health insurance coverage for public assistance recipients, either through Blue Cross-Blue Shield of Texas, or by a commercial carrier. This will insure the patient the free choice of physician and hospital; it represents minimal governmental control; and it will facilitate effective administration of the program."

For Texans at least, a voluntary health insurance program would insure continued high quality medical care.

Shift of Emphasis

During the first decade of this century, the average life span of man was in the 50's and the physician spent most of his time treating patients with acute illnesses. With the advent of antibiotics and chemotherapy, a major shift of emphasis was noted and more of the physician's time was directed toward treatment of those with chronic illnesses. Today, with momentous progress in medical science and surgical procedures, the average life span of man is 73 years.

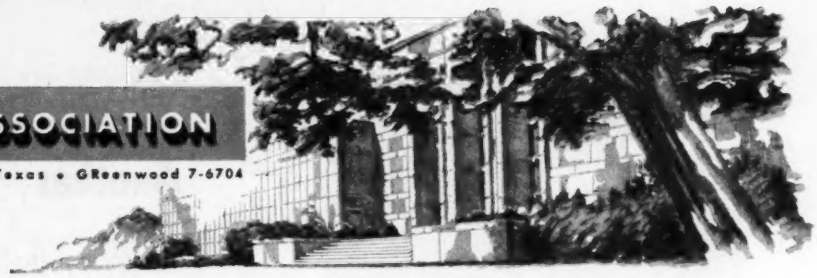
Although the life span has been increased, the aftermath of this program has been new and more urgent problems of an older generation, plus an increasing number of patients of all ages with chronic illness—and often involving several diseases entities. Many of these patients are no longer vocationally productive, as they have residual, and sometimes relatively permanent, disabilities. Problems of chronic illness and their impact on the social, economic, vocational, and educational aspects of the community are becoming critical.

Physicians spend much time in evaluation of patients with varying illnesses as to etiology and therapeutic management. Generally, they do not expend comparable diligence in objective evaluation of the same individual's remaining abilities, assets, or work capacities. Specific objective criteria regarding vocational productivity would be helpful to the potential employer, and should be approached in objective terms including what the patient should avoid, his physical and emotional tolerance in a work situation, and correlation with the physical and personality aspects of the individual patient. For instance, rather than commenting, "Patient should avoid heavy lifting", the doctor should state, "Patient can lift up to 50 pounds at one time and can continue such activity for 4 to 5 hours each day". Through medical judgment disability can be minimized and the patient can be helped to utilize remaining abilities to extend his physical capacity to full productive tolerance.

Physical handicaps are basic human limitations from a medical viewpoint, whether they are attributable to injury, disease, or congenital anomaly. The physician should determine whether such residuals are temporary, permanent, partial, or complete and, by careful analysis, show how the patient's remaining abilities will allow him to be productive, and not a liability, in a particular job. A physical handicap is different from an occupational handicap, which, in essence, is the lack of ability to fulfill all necessary requirements of a job. These may include skill, experience, intelligence, educational background, aptitude, interest, personality, and physical condition. Each person is occupationally "handicapped" for those jobs in which he cannot fulfill all of those necessary requisites. Therefore, if the physician is to assume his responsibility, he must further determine principles to assess functional capacities and to correlate them with vocational capabilities of patients with chronic disability.

More physicians need to be oriented regarding available restorative resources within the community. In this way, it will be possible to deal more adequately with the social, economic, and vocational problems of patients with chronic illness, and to make their increased life span more productive and enjoyable.

—Lewis A. Leavitt, M.D., Houston, Texas, Chairman, Department of Physical Medicine, Baylor University College of Medicine.



TEXAS MEDICAL ASSOCIATION
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Pinch Hitter or Sideliner?

Have you, as a physician, been called to a nursing home to attend an aged person? Have you had a feeling of remorse as you went down the corridors and noticed one aged individual after another confined to his room and sitting near his bed? Has the thought ever occurred to you that here the aged are enclosed in a living tomb? On that same day you rush home so that you can do your share for the "Little League Movement".

We must realize that our way of life has changed. We not only have the responsibility for developing our youth, but we must also assume our responsibility to the aged.

Would it not be a step forward if members of the medical profession in each community brought the responsibility of the aged to the attention of their respective communities? We must assist the aged by counseling on recreational activities, rehabilitation, mental and physical health, and employment in fields designed for the aged. We must help businessmen realize that it would be to their advantage to forget the arbitrary figure of 65 and fit the man to the job. Certainly, aged individuals would rather receive a salary for their endeavors than a retirement fund that automatically implies, "We are giving you this money to curtail your present activity and are guiding you to a living tomb or to the city of the living dead."

We must concentrate our activities toward rehabilitative care. Custodial care is not paramount in most cases and only increases the infirmities. Maybe a "Little League", a program of planned activities or vocational training for individuals in their second childhood, would be the ideal solution for the aged.

Harvey Renger, M.D.
President, Texas Medical Association

Another WELFARE Dole?

A Report on Indigent Medical Care Needs Of Texas Public Assistance Recipients

IN NOVEMBER, 1958, Texas voters approved an amendment to the state Constitution authorizing the Legislature to establish a program of medical care for the state's 319,000 Public Assistance recipients (individuals who receive funds through the programs of Old Age Assistance, Aid to Dependent Children, Aid to the Blind, and Aid to the Permanently and Totally Disabled).

The 56th Legislature (1959) took no action; but the 57th Legislature this year passed Senate Bill 79 which embodies a state-federal financed vendor-payment program for Old Age Assistance recipients only. As this is being written the amount to be appropriated by the Texas Legislature for such a program is unknown; however, it is anticipated that a minimum of $15,000,000 in state funds will be appropriated biennially. If it is, approximately $46,000,000 biennially in federal matching funds will be available.

Basic to the development of such a welfare program should be an accurate determination of the *actual need* for such a service. This is especially true of any governmentally-sponsored program which intends to provide medical services to indigent persons. This concept is so fundamental that most public officials who pass upon medical care programs and many professional persons who assist in developing such legislation assume that needs are clearly known and that the only problem is to find the best method of meeting them.

This, however, is not the case. The extent and degree of medical needs in Texas or the United States is not known. Unfortunately, because medical care needs are complex, elusive, and difficult to measure, all analyses to date have been incomplete. Thus, governmentally-financed medical care programs are usually the offspring of emergency situations, sometimes imperfectly understood or exaggerated by public emotion and political opportunism. Rarely have they been undertaken with full realization of their ultimate consequences.

Texas is one of four states that do not have in operation a state-federal—financed medical care program for public assistance recipients. Anticipating a program to be enacted by the 57th Legislature, the Texas Department of Public Welfare requested the Texas Research League (a non-profit corporation) to undertake a complete analysis of the medical needs of the 319,000 Public Assistance (P. A.) recipients and to recommend the type of program that

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Data for this article resulted from an 18-month intensive analysis of medical needs of 319,000 Texas Public Assistance recipients. A 57-page printed report on this analysis is available from the Texas Research League, Drawer C, Capitol Station, Austin 11, at $1 per copy. This report is part of a comprehensive study of all welfare programs administered by the Texas Department of Public Welfare.

could best meet such needs. The study, launched in January, 1959, was completed 18 months later. To the League's knowledge, it is the most extensive analysis of its type ever undertaken.

The study is unique. Instead of analyzing a welfare program already in existence and recommending changes to make that program more effective, the study was concerned with determining the actual need for a welfare program and the best method of meeting such a need. The study was confined to analysis of the medical needs of Public Assistance recipients only, but the ramifications are much greater. As defined by law and policy, P. A. recipients are the most economically deprived group in the nation. If they have unmet medical needs of consequence, it would suggest that other groups above them on the economic ladder should be studied to see if they also have unmet medical needs. Conversely, if no, or only limited, medical needs were found among these persons, it would be likely that no new governmentally-sponsored medical programs would be needed for other groups. The key to the problem is the extent of unmet medical need.

Medical Needs of Recipients

Three definitions are important to an understanding of the data that follows:

Medical Need: This is a physical condition which requires medical attention. A tabulation of such needs would reflect the *gross* medical needs of P. A. recipients.

Unmet Medical Need: This is a physical condition which requires medical attention, but that attention will not be provided under existing circumstances. A tabulation of these needs would reflect the *net* medical needs of P. A. recipients.

"But he's a great outdoorsman, Doctor, and says he always sleeps in a tent."

Respondable Medical Need: These are the unmet medical needs for which it is possible to provide the needed medical care. Such needs can "respond" to governmental or nongovernmental action.

It is this latter group which is important to find.

The term "medical needs" often is used by proponents of more governmental purchase of medical care services. The term is meaningless. For example:

> The 319,000 Texas P. A. recipients represent 255,000 cases. (An Aid to Dependent Children case may include a "caretaker" and up to four children.) Of these cases, 117,300, or 46 per cent, were found to have a medical need, however
> Only 21,400, or 8.5 per cent, had a medical need that was *not* being met, but
> Only 8,718, or 3.5 per cent, had a medical need not being met which could be met by the introduction of a new program. Therefore, these cases have a *respondable* medical need.

Of the 21,400 cases with unmet medical needs, there were 9,600 cases already eligible for free medical care, *but the recipients refused to accept such care.*

These figures seem low when compared to public statements which have been made about widespread medical needs, especially among the aged. *Yet the facts clearly show that most of the medical needs of Texas P. A. recipients are being met under existing programs.* In fact, during 1960, Texas Public Assistance recipients received $42,300,000 in free medical care. (This figure is an absolute minimum since many free services are given on a confidential basis, and data cannot be obtained.)

Those P. A. cases with intense (serious) respondable needs reside in counties which have a larger than average proportion of welfare recipients. Most of these counties are in rural areas. Generally, they provide no tax-supported medical care programs or they have very limited programs of that type. Cases with less intense needs (hearing aids, dentures, glasses) are scattered throughout the state.

The *greatest volume* of respondable needs are found among Old Age Assistance cases; however the *most intense* medical needs are found among the adults in the Aid to Dependent Children caseload.

Cost of Meeting Needs

In every case with a respondable medical need, the research staff calculated the funds necessary to meet the estimated need. During the next biennium such needs could be met by an expenditure of $2,800,000. It is estimated the cost would approximate $2,200,000 for each biennium thereafter. In contrast, it is anticipated that the program envisioned in S. B. 79 will cost a minimum of $60,000,000 a biennium. Why such a major difference in cost?

Under the program as recommended in the League study, no federal funds would be accepted. This would permit the State of Texas to adopt realistic

controls over the state-financed program which would prohibit:

1. Transfer to the new program of the $42,300,000 annually in medical care services now being paid for by other units of government, relatives of recipients, private welfare agencies, and other interested agencies or individuals.
2. Spreading of medical care funds thinly across the entire public assistance caseload, thus, in effect, becoming an excuse for another "welfare dole".

Under the League program funds would be allocated to cases only on a specific need basis, but to the extent necessary to solve that need. Thus, by not permitting the transfer of responsibility and by exercising careful control over fund use, it is possible to keep government paid medical care costs far under those of other states and yet provide optimal medical care to those who really need such care.

The difference in cost also underscores a basic weakness in American public welfare programs, wherein the *intensity of individual need* is not the *primary* criterion used by welfare departments to administer funds and services. Actually, it seems that over the years the primary criterion has become that of spreading available moneys as thinly and widely as possible over significant segments of the population—a purely political approach. This has resulted in a disregard of true needs, enactment of rigid laws, encouragement of inflexible limits on the type and extent of welfare services, and administrative solicitation of line item budgets. These factors reduce to a minimum the latitude for administrative decisions on the merits of individual welfare cases.

Without question any welfare program under which grants are varied to meet specific needs and to solve specific problems will be attended by administrative, and more importantly, political problems. Conversely, if the program is not so oriented, it cannot meet respondable medical needs effectively. This malorientation is the major reason that respondable medical needs are seldom met effectively by state-federal medical care programs, despite the extent of expenditures.

Conclusion

From this analysis of medical needs of P. A. recipients, these conclusions can be drawn:

1. Medical needs that can respond to any type of new governmental program are much lower than anticipated and do not conform to public statements made during the recent political campaigns.

2. Where needs were found, they were of the type that would require highly flexible, intense attention —an intensive individualized approach contrary to most public welfare program administration.

3. No reason can be found for the federal government entering this field. Respondable needs can be met adequately and more effectively by a state-local governmental approach which does not attempt to duplicate or replace existing public or private welfare programs, or services provided by relatives of the recipient.

4. The use of vast amounts of federal-state medical buying power can severely disrupt the dispensing of medical services to the population as a whole. The ultimate consequence could only be an increase in medical care costs and/or a lowering of professional standards.

The report draws this overall conclusion:

Traditionally in the public welfare field, the desire to achieve uniformity and eliminate controversy has made public welfare programs so broad based that they do not meet these intense needs which presumably motivated their enactment. Because in the medical care field the problem often involves the life of a person, this classic pattern must be avoided. If it is not, despite the large outlays of public moneys, persons in real need of medical care on a major scale will still not have that level of care forthcoming, and what passes for a medical care program will amount, in effect, to a welfare "dole".

—ARIS A. MALLAS, JR.,
Austin, Texas.

Seven Medical Leaders Tapped for VA Committee

Seven of the nation's top medical leaders will advise the Veterans Administration on its nationwide medical research program as members of a newly constituted VA Research Advisory Committee.

Chairman is Dr. Harold Wolff, the Anne Parrish Titzell Professor of Neurology at Cornell University Medical College. Other members include Dr. Charles G. Child, chairman of the Department of Surgery, University of Michigan Medical School; Dr. I. Arthur Mirsky, professor and chairman of the Department of Clinical Science, University of Pittsburgh School of Medicine; Dr. Harry M. Rose, chairman of the Department of Microbiology, Columbia University College of Physicians and Surgeons; Dr. Eugene A. Stead, chairman of the Department of Medicine, Duke University School of Medicine; Dr. Eliot Stellar of the Institute of Neurological Sciences, University of Pennsylvania School of Medicine; and Dr. Stafford L. Warren, Dean, University of California at Los Angeles School of Medicine.

This committee represents consolidation of three groups: the Advisory Committee on Research, the Advisory Committee on Radiobiology and Radioisotopes, and the Advisory Committee on Problems of the Aging.

Measurement of Coronary Blood Flow

Raymond D. Pruitt, M.D., Edward W. Dennis, M.D., Walter S. Henly, M.D., and Philip C. Johnson, M.D.

The authors in a clinical conference describe methods of measuring coronary blood flow which have been devised from older less adequate methods. Emphasis is placed on the need for cooperative efforts of scientists and clinicians in perfecting measurement techniques.

DR. RAYMOND D. PRUITT: In the field of human physiology and disease, certain problems seem to have been designed by nature specifically to frustrate man's efforts to attain precise, quantitative information concerning them. One of these problems is the subject of this conference: measurement of coronary blood flow. The organ supplied by blood lies in the thoracic cavity, one of the last regions of the body to yield to surgical exploration. It is an organ from which not even the venous drainage is united; hence there is no ready way of catching what flows out, and determining thereby what flows in. It is not an organ which, like the kidney or the liver, secretes, excretes, or detoxifies, and its specific metabolic functions can be appraised only by direct approaches.

Today's methods of measuring coronary blood flow are projections of resourcefulness and determination of earlier investigators. Dr. Dennis will initiate the discussion by reviewing certain of these contributions.

Historical Observations

DR. EDWARD W. DENNIS: The clinical imperative for information concerning adequacy of coronary flow stems from considerations which are fairly common knowledge. Heart disease is one of the leading causes of disability and death in this country. In 1950 there were about 354 cardiac deaths per 100,000 population per year, of which 145 were due to coronary artery disease. This incidence of mortality from coronary artery disease has been steadily rising, from a level of 7.9 per 100,000 in 1930 to its present level of 145. Most elderly people, and I will avoid defining "elderly", have some impairment to coronary flow. In clinical medicine, it has been necessary to infer impairment to coronary flow from a clinical picture. The physician has been forced to wait until electrocardiographic evidences become apparent or, more importantly, until historical evidences of coronary disease develop. Often a diagnosis of coronary artery disease is not made until after the occurrence of an acute myocardial infarction.

Dr. Raymond D. Pruitt, a member of the faculty of the Baylor University College of Medicine, was moderator of the clinical conference presented before the faculty and students on Oct. 8, 1960.*

This frustration is analogous to the problem that exists in cerebrovascular disease, in which presence of the disease sometimes can be inferred from a story of transient episodes of cerebrovascular insufficiency but in which more often the appropriate diagnosis is not made until a stroke, with its catastrophic consequences, has taken place.

Measurement of coronary flow is essential for reasons other than aiding in the diagnosis of coronary disease. Such a measurement is desirable for appraising the efficiency of pharmacologic agents, for ascertaining the effect of various disease states on coronary flow, and for the study of myocardial metabolism.

Imperfect as methods have been for measurement of coronary flow in the human being, the story of past efforts to appraise that flow is of interest. The initial description of angina pectoris dates back to Heberden in 1768.[4] Myocardial infarction as a clinical entity was not adequately described until about 1912.[5] Long before this, however, astute physiologic observations on coronary flow and its characteristics were being made. In 1895, Langendorf[9] by an ingenious method of determining the venous overflow from the right atrium in a suspended perfused heart, derived a crude quantitation of coronary flow.

The ingenuity of physiologists has been taxed to the extreme in trying to devise a method of precisely measuring coronary flow. That 12 or 15 methods have been described, many by the same investigator, is testimony to the fact that none devised thus far is completely satisfactory. Improvement over the early crude methods was made possible in studies utilizing the heart-lung preparation developed by Starling about 1912.[8] At that same time, the importance of obtaining the coronary sinus drainage was realized by Morawitz.[10] He introduced an ingenious cannula, which when placed in the coronary sinus, trapped the coronary venous drainage. Others who contributed in this early period to methods of measuring coronary flow were Wiggers,[14] Anrep,[1] and Gregg.[2]

Several types of coronary flow can be determined. One that attracted interest at an early period was the phasic coronary flow, the pattern of flow observed in the various phases of the cardiac cycle. It was soon appreciated that most of the coronary flow occurred during diastole and that ventricular systole served as an impediment to coronary inflow. Devices for measuring phasic coronary flow included the bubble flow meter, the orifice meter, the pitometer, and various types of meters based on the principle of heating filaments and determining the amount of heat lost downstream.

Today investigators are interested in appraisal of mean coronary flow. For this measurement also, many methods have been devised. One which has served as a standard for comparison is the nitrous oxide technique. This method is an application of the procedure introduced by Kety and Schmidt in 1945[7] for measuring cerebral blood flow. Both measurements are based on the familiar Fick principle, which states in essence that the blood flow per unit of time through a specific organ equals the amount of the substance taken up by that organ, divided by the difference in the concentrations of the substance in the blood entering as compared with the blood leaving that organ. Determination of the venous concentration in this measurement of coronary flow entails catheterization of the coronary sinus.

Application of more refined techniques have disclosed several interesting facts about coronary blood flow. The left coronary artery supplies most of the left ventricle. The venous drainage from the left coronary artery goes almost exclusively into the coronary sinus and the right coronary artery contributes virtually nothing to coronary sinus drainage. The right coronary artery supplies in large measure the right ventricle. The flow through the left coronary artery is about 85 per cent of total coronary flow; that through the right, the remaining 15 per cent.

As regards delivery of oxygen, a unique situation exists in the heart. Extraction of oxygen from arterial blood by the tissues generally approximates 4 volumes per cent, the arterial oxygen saturation being about 20 volumes per cent and the mixed venous saturation about 16. In contrast, oxygen saturation in coronary arterial blood is the same as for other parts of the systemic arterial circulation, whereas coronary sinus oxygen saturation is only about 6 to 8 volumes per cent. Therefore, the heart cannot accomplish increased needs for oxygen induced by

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**Presented on the occasion marking the award by the National Heart Council of its first Cardiovascular Research Center Grant to the Baylor University College of Medicine. Drs. Pruitt, Dennis, and Johnson are members of the faculty of the Department of Medicine. Dr. Henly is a member of the Department of Surgery and is an established investigator of the American Heart Association. Dr. Henly's work was supported by grants from the American Heart Association, Texas Heart Association, and Houston Heart Association.*

increased extraction by work; it has to accomplish this by increased coronary flow.

As will be pointed out later, the coronary flow is thought to be about 4 to 5 per cent of cardiac output. This means that in a person who has a resting cardiac output of 4½ liters, the total coronary flow is about 225 cc. per minute.

Experimental Measurement by Radioisotopic Technique

DR. WALTER S. HENLY: Several years ago it became apparent that disease of the coronary arteries might be amenable to surgical measures of treatment. The methods available at that time for appraising revascularization of the heart were inadequate, even though numerous surgical methods were being advocated both clinically and experimentally. Dr. Oscar Creech and I endeavored to work out a method of determining coronary blood flow based on the principle that the coronary circulation in the anatomically normal heart is in reality a left-to-right shunt, the extent of which could be ascertained by intracardiac sampling methods. Our technique was based on the continuous injection method of determining flow. A brief historical note about this technique is appropriate.

Stewart, in 1894,[12] introduced continuous and instantaneous injection methods of determining flow. Hamilton[3] objected to the continuous injection method as a means of determining cardiac output, favoring the instantaneous method. However, the continuous technique remains an excellent method of determining the flow in a system. If an indicator is injected into a flowing system and injection is continued until equilibrium is approached, then the plateau height of this equilibrium concentration is an inverse function of flow. Fig. 1 illustrates an ideal dilution curve, showing that when injection is begun, an asymptotic rise occurs until a plateau is

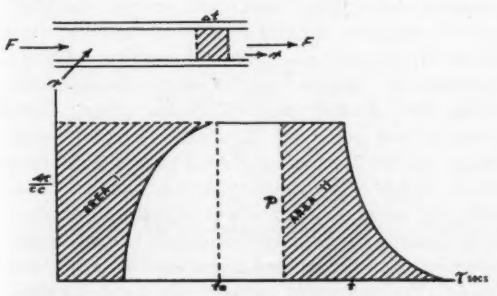

Fig. 1. Diagram of ideal dilution curve obtained following continuous injection of an indicator substance with no recirculation during the period of injection. Rate of flow is inversely proportional to the plateau concentration.

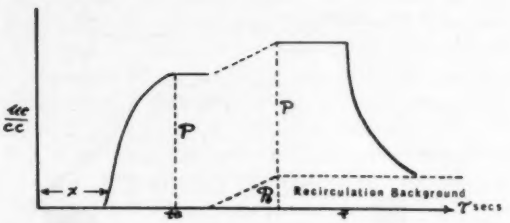

Fig. 2. Diagram of dilution curve showing effect of recirculation of indicator substance during the period of continuous injection.

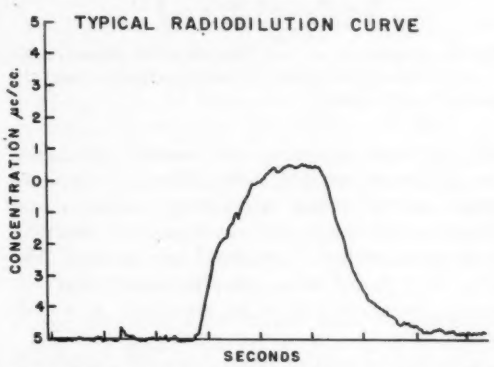

Fig. 3. Drawing of actual radiodilution curve obtained from in vitro system demonstrating similarity to ideal curve.

reached, then falls off. Fig. 2 illustrates what happens if recirculation occurs during the time of continuous injection. This was Hamilton's basic objection to using the continuous injection technique in determining cardiac output in the human being. Recirculation causes a rise of the plateau concentration equal to the recirculation background, thus introducing potential error into the determination. If one recognizes this distorting element, however, it is possible to determine accurately the cardiac output, even with recirculation. Fig. 3 represents a drawing of an actual radiodilution curve obtained in an *in vitro* or *in vivo* system showing that it approaches an ideal type of curve.

Fig. 4 is a diagram of our earliest apparatus for measuring coronary flow by radioisotopic methods. This assembly admittedly was crude, but it included essential elements of the apparatus currently in use. By means of an automatic injector, a radioisotope could be introduced into the circulation. A spiral of Archimedes cam drove the injecting plunger of the syringe. The isotope was injected into the left side of the heart, either into the pulmonary wedge or into the left atrium. A sample of blood containing a venous mixture of radioactive isotope was drawn from the pulmonary artery. The mixture was a composite derived from all the tributaries that emptied

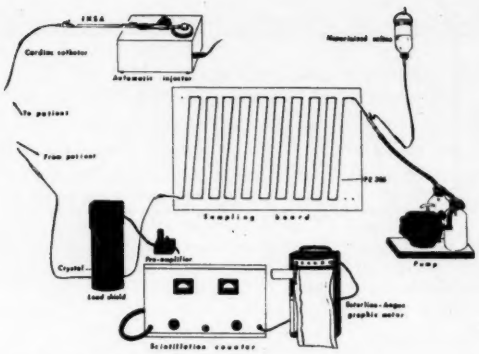

Fig. 4. Diagram of earliest apparatus for determination of myocardial blood flow utilizing radioiodinated (I^{131}) human serum albumin.

into the heart, including the coronary circulation. The small polyethylene tube through which the sample was withdrawn was guided beneath a lead encased scintillation crystal. An immediate recording of the radioactivity of the blood was obtained. The tubing then passed onto a sampling board, thus permitting determinations to be reanalyzed at a convenient time.

From such a sample taken from the pulmonary artery, a radiodilution curve was obtained which resembled that from the right ventricle (Fig. 5). If a sample was taken simultaneously from the superior vena cava, a similar curve was recorded, but one which indicated that the isotope from the superior cava (which brings the isotope into the right atrium earlier than does the inferior cava), returned approximately five seconds following appearance of radioactivity in the composite sample derived from

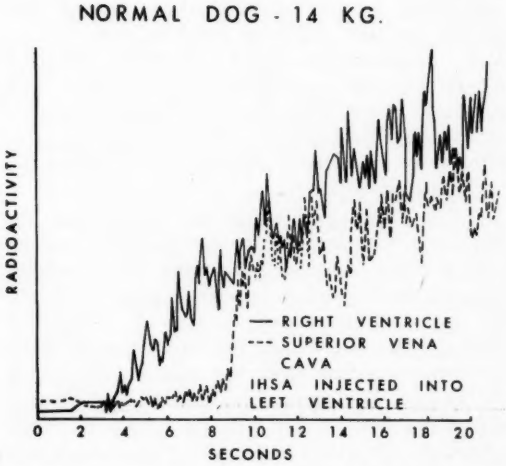
NORMAL DOG - 14 KG.
RADIOACTIVITY
— RIGHT VENTRICLE
--- SUPERIOR VENA CAVA
IHSA INJECTED INTO LEFT VENTRICLE
0 2 4 6 8 10 12 14 16 18 20
SECONDS

Fig. 5. Radiodilution curves obtained in a normal dog by monitoring blood samples simultaneously withdrawn from the right ventricle and superior vena cava.

the pulmonary artery or right ventricle. Fig. 6 includes curves derived from several sites, namely, the composite curve (right ventricle), the curve from the coronary sinus, and the superior and inferior caval returns which occurred much later. We believed that the area between the right ventricular and superior vena caval curves was representative of coronary blood flow.

After much study, it was realized that when a clearly defined area occurred between these curves in dogs, they were in mild shock and their systemic venous return was sluggish. In normotensive dogs, the venous return was so rapid that the superior caval return masked coronary blood flow. Because of this masking, we endeavored to fractionate the total curve and identify the coronary component, much as a chemist would obtain a pure substance by distillation of a compound. To do this we utilized the tech-

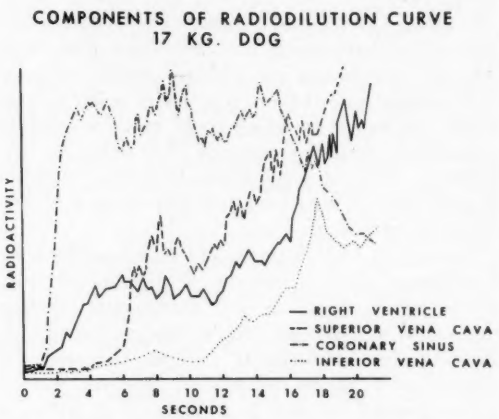

Fig. 6. Composite radiodilution curve from right ventricle with superimposed tracings obtained simultaneously by sampling from the coronary sinus, superior and inferior venae cavae to show components of the curve.

niques of open heart surgery, diverting flow from the superior and inferior vena cava, so that no blood reached the heart directly by way of the cava. Caval blood was pumped to an elevated reservoir (Fig. 9). By means of a stopcock on the return tubing, cardiac inflow was adjusted until the cardiac output, blood pressure, and pulse rate approached normal preoperative levels. We had no control over the coronary return which was exactly what we wanted. Blood from the pulmonary artery was sampled to obtain a radiodilution curve. From a sample taken simultaneously from the femoral artery, cardiac output was derived. The pulmonary radiodilution curve consisted of a pure coronary component diluted by the cardiac input, followed by a separate peak of systemic venous return which previously masked the coronary component (Fig. 8).

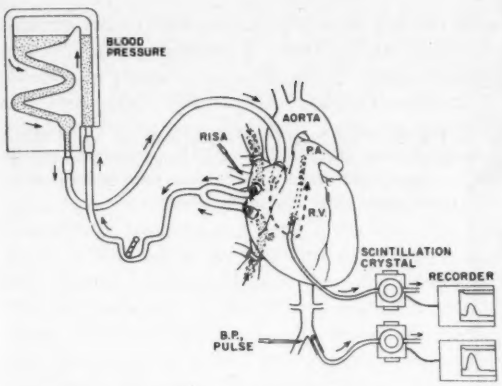

Fig. 7. Diagram of physiologic preparation for separation of coronary component from other components of the radiodilution curve.

Fig. 7 illustrates the recording equipment now being used: the continuous injector, two scintillation crystals, two recorders, and two rate meters on a cart.

Using this technique, we evaluated the action on the coronary flow of certain of the vasopressors: epinephrine, levarterenol, and phenylephrine. Fig. 10 shows what happens to a dog in hemorrhagic shock. In such an animal, at a blood pressure of 30 mm. of mercury, the coronary blood flow would approximate 55 cc. per minute. When the venous return is kept at reduced levels by means of a pinchcock on the cardiac input tube, administration of levarterenol is attended by a rise in blood pressure and an increase in coronary flow (Fig. 10, "levarterenol" curve). However, the increase in coronary flow in relation to rise in blood pressure is greater than that increase attending a rise in blood pressure effected by increasing the blood volume (Fig. 10, "Δ Blood Volume" curve). Levarterenol apparently induces a vasodilator response in the coronary arterial circulation.

In contrast, phenylephrine (Neo-synephrine) administered to the animal in shock effects a relatively lesser increase in coronary flow per unit rise in blood pressure (Fig. 11, "phenylephrine" curve) than does an increase in pressure accomplished by increasing the blood volume (Fig. 11, "Δ Blood Volume" curve). Responses of the same dog to subsequent administration in sequence of levarterenol and epinephrine are recorded also in Fig. 11. These findings, together with the observation that phenylephrine effects a reduction in coronary flow in an animal maintained at normotensive levels, afford a basis for the suggestion that this drug may be less acceptable than levarterenol in the treatment of cardiac crises in the dog.

By means of the technique just described coronary flow has been measured in animals in hemorrhagic shock and following administration of various pressor amines. This technique bears promise in terms of both its laboratory and its clinical applications. Much remains to be done in perfection and application of the method.

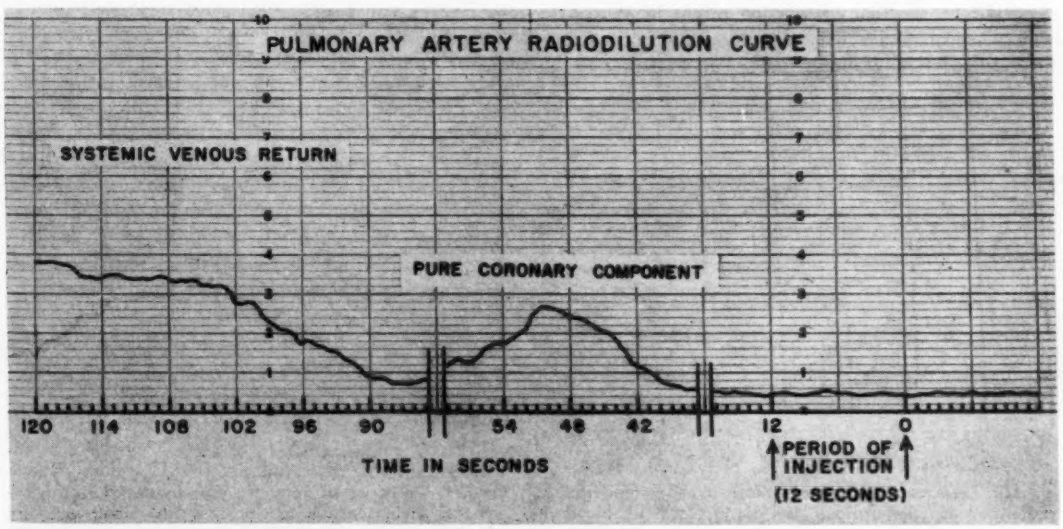
PULMONARY ARTERY RADIODILUTION CURVE
SYSTEMIC VENOUS RETURN
PURE CORONARY COMPONENT
120 114 108 102 96 90 54 48 42 12 0
TIME IN SECONDS
PERIOD OF INJECTION
(12 SECONDS)

Fig. 8. Pulmonary artery radiodilution curve obtained from preparation of kind diagrammed in Fig. 7, wherein the coronary venous return is separated from the systemic venous return.

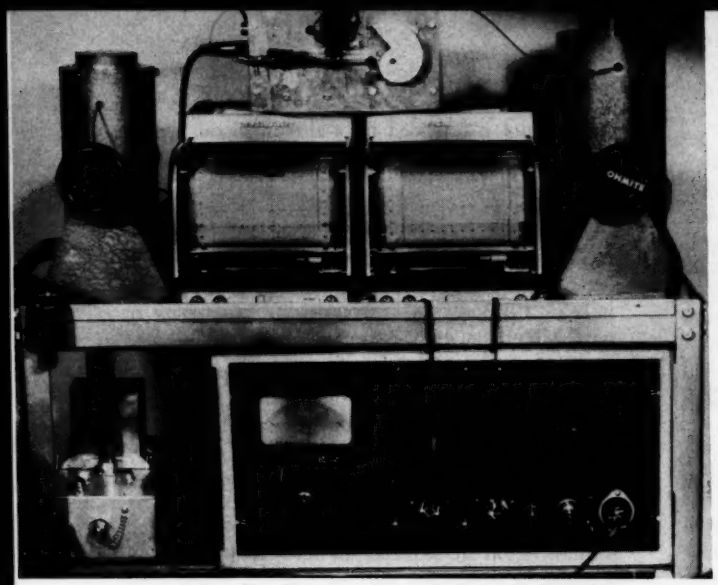

Fig. 9. Photograph of equipment to show automatic injection (top), lead shielded scintillation crystals (left and right), twin rate meters (bottom), and dual recorders (center).

New Appraisal Method by Radioisotopic Technique

DR. PHILIP C. JOHNSON: My interest in the measurement of coronary flow developed indirectly when one of my associates, Dr. Gunnar Sevelius requested that I help him devise a radioisotopic method for measuring uterine blood flow. We attempted to do this by placing scintillation detectors over the surface projection of the uterus. The radioactivity monitored over any organ is primarily a reflection of cardiac output, since dilution of the tracer bolus occurs primarily within the cardiac chambers and not in the peripheral organ under study. However, local vascularity and flow do affect these curves. If information is to be gained about flow through a specific organ, that knowledge might be derived from a calculation which relates cardiac output to the localized flow through the organ. Pursuing this logic, we placed radioactive detectors over the heart and over the uterus to monitor the passage of the tracer bolus through these organs. Analysis of the curves derived from the cardiac region showed that in addition to systemic cardiac output, this curve included a component related to coronary flow. We found that it was possible to separate the coronary flow curve from the curve of cardiac output. From this finding, we eventually developed a method for appraising coronary flow while attempting to devise a method for measuring uterine blood flow.

Certain facts about the cardiac output curves already have been recorded and interpreted prior to our work. Prinzmetal (1949)[11] identified two peaks in the curve obtained by monitoring the passage of radioactivity on the chest wall. He

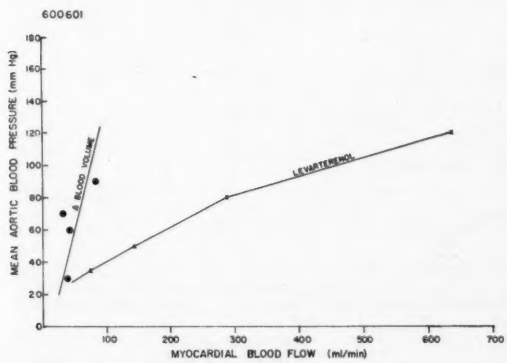

Fig. 10. Response of coronary flow in dog rendered hypotensive by hemorrhage to (a) increase in blood pressure effected by increasing the circulating blood volume; (b) increasing the blood pressure by administering levarterenol, cardiac input remaining fixed.

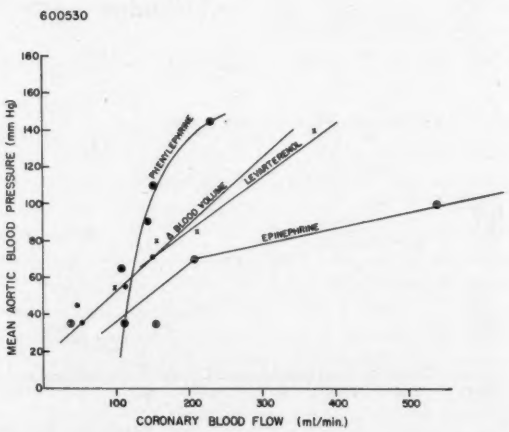

Fig. 11. Response of coronary flow in dog during hemorrhagic hypertension to increase in blood pressure effected by a) administration of phenylephrine; b) administration of levartenol; c) administration of epinephrine; d) increasing circulating blood volume.

ascribed this to flow through the right and left sides of the heart. He identified curves pecular to certain disease states including congestive cardiac failure and intracardiac shunts. Huff[6] initiated efforts to compute cardiac output from these radioisotopic curves. None of these investigators was cognizant of the presence of the coronary flow curve contained on the downslope of the cardiac output curves. Waser and Hunzinger,[13] in Switzerland, were the first to attempt an estimate of coronary flow from the curve obtained over the heart. Hunzinger tried to make use of the first recirculation of the tracer bolus into the right side of the heart as an estimate of coronary flow by comparing the area of that curve with the cardiac output curve.

Fig. 12 shows a curve obtained in one of our studies in which the right and left heart components are labeled "R" and "L" respectively and the coronary component lies between the two curvilinear lines going from the top of the curve to the baseline. On the basis of observations on physiologic preparations and on flow models we devised the following equation for calculating the percentage of cardiac output passing to a specific organ:

$$\% \text{ Flow} = \frac{A_p^2 \times T_h}{A_p^2 \times T_p} \times 100$$

A_p^2 Square of area of time activity curve.
T Transit time of the bolus.
p Peripheral organ.
h heart

We then applied this method to patients known to have had a myocardial infarction. Fig. 13 shows curves recorded from detectors placed over the heart of such a patient. The area beneath the coronary peak is relatively less in the curve obtained from this patient who had experienced myocardial infarction (Fig. 13) than in a normal patient (Fig. 12).

This method can be applied also in appraising changes in coronary flow from one occasion or circumstance to another in the same patient. Results of this test have led us to conclude that nitroglycerin increases coronary flow, a conclusion which has been disputed for many years, and is still disputed by many. Comparable studies have been made on certain of the nitrates having a slower and more prolonged pharmacologic effect, and again increases in coronary flow have been recorded. Results of studies analyzed thus far lead us to propose that in normal young people, coronary blood flow is greater than 5 per cent of cardiac output. Patients having coronary sclerosis, as expressed in a history of either myocardial infarction or angina pectoris, commonly have a coronary flow less than 4 per cent of the cardiac output. There appears to be good correlation between the coronary blood flow obtained by this method and clinical evaluation of the patient. Increase in percentage of coronary flow under the influence of vasodilating drugs has been recorded both in the normal group and in the group with coronary disease.

Our method retains imperfections. Extrapolation of the recorded curves entails hazards to accuracy;

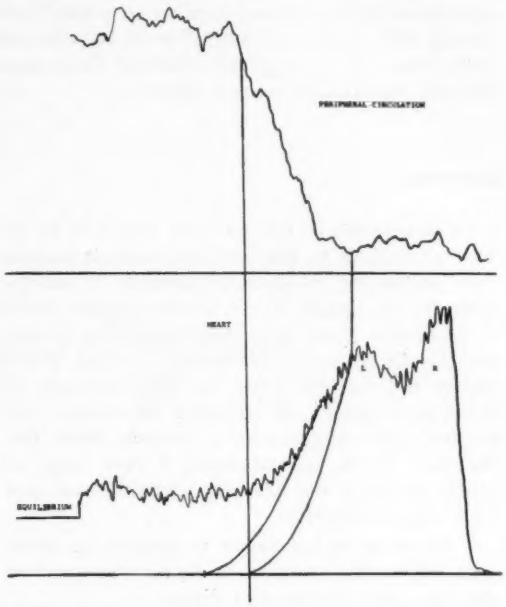

Fig. 12. Myocardial blood flow curve from a normal male. The coronary area lies between the two extrapolated lines on the left heart peak. The peripheral channel is used to locate the beginning and end of the left heart extrapolation.

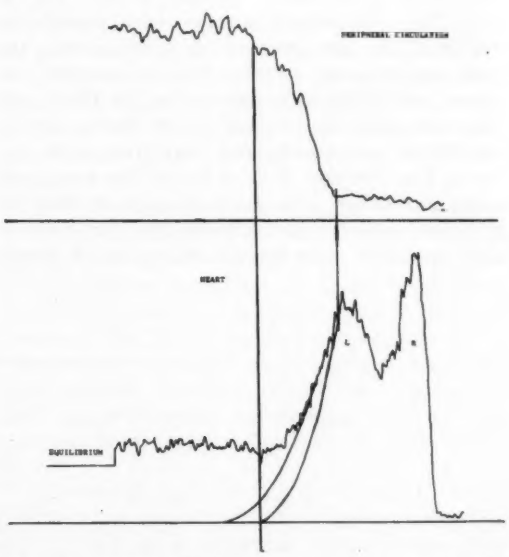

Fig. 13. Myocardial blood curve of a patient with angina. Note that the coronary area is less than that found in the normal curve.

bias can affect these extrapolations and produce almost any results the observer might choose to favor. We shall consider that our efforts are rewarded if applications of the method continue to permit individuals with normal coronary flow to be separated from those with such grossly abnormal flow, as in clinically significant coronary disease.

Summary

DR. RAYMOND D. PRUITT: The story told by the three participants in this conference affords basis for reflection on the evolution of advances in the care of the ill. Dr. Dennis, in his historical review, noted as the earliest event, the description of angina pectoris by the clinician, Heberden, in 1768. For a century and half thereafter, no great advance occurred in diagnosis and treatment of coronary disease nor in the measurement of coronary blood flow. The past decade has witnessed a new surge of activity in which the following elements have provided critical stimulation.

1. The clinician has sought to improve on inadequate diagnostic techniques to define who does and who does not have coronary disease.

2. Both internist and surgeon have sought more accurate means of appraising precisely what the therapeutic measures they employ (drugs or surgical operations) do to and for the patient on whom they are applied.

3. The fundamental sciences have contributed technical advances essential to accomplishing the ends sought by the clinician. The radioisotope techniques used by both Dr. Johnson and Dr. Henly, and the instrumentation essential to Dr. Henly's bypass procedures, are contributions from these basic sciences. The interplay of these factors has eventuated in an increasingly close association among scientists and clinicians from all discipline. The lines between their specialties often become blurred as the search for solution to specific problems proceeds. The clinicians who seek to improve on the medical practices of earlier generations must borrow from the professional scientist whose home is the laboratory. Clinicians, however, must do more: they themselves must achieve sufficient proficiency and understanding in the methods and problems of the laboratory to insure an honest and productive relationship between the efforts of the laboratory scientist on the one hand and the needs of the patient on the other.

To the advance of this collaboration between the laboratory and clinical sciences we hope our newly established Cardiovascular Research Center of the Baylor University College of Medicine will provide essential and intelligent support.

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Dr. Henly, Department of Surgery, Baylor University College of Medicine, Houston 25.

Abstracts from a symposium held Nov. 28-Dec. 2, 1960, in Houston, sponsored by the University of Texas Postgraduate School of Medicine. Edited by E. L. Wagner, M.D., Earl F. Beard, M.D., and Robert B. Crouch, M.D. Participants in the symposium were the following: Jesse Edwards, M.D., Rochester, Minn.; Richard Gorlin, M.D., Boston; Ancel Keys, Ph.D., St. Paul, Minn.; Raymond D. Pruitt, M.D., Houston; Charles Friedberg, M.D., New York; George Griffith, M.D., Los Angeles; and William Likoff, M.D., Philadelphia.

Coronary Artery Disease

DR. EDWARDS has reaffirmed by pathologic studies that coronary artery disease is the major cause of death in the United States. He is of the opinion that "generalized sclerosis" is a poor term because the disease is of segmental nature. He believes that the diagnosis of sclerotic vascular disease should be made by the clinician in each specific vessel by clinical means.

Histologically, the primary lesion of coronary artery disease is believed to be that of lipoid deposition. In addition, there must be assistance from various mechanical stress factors for the segmental lesion to be aggravated. The most significant complication of this process is stenosis of the arterial lumen.

Dr. Gorlin discussed the pathologic physiology of coronary artery disease, primarily in relationship to the methods of study in this difficult problem when limited to studies of man. He described the method of inserting a venous catheter into the coronary sinus to study arterial venous oxygen differences. Dr. Gorlin considered that he was actually examining the arterial oxygen concentration of blood leaving some portion of the left ventricle after this portion of the myocardium had been perfused with blood. Of 22 patients with clinically demonstrable angina pectoris, 82 per cent gave evidence of abnormal degrees of oxygen extraction. Conversely, among 20 individuals with abnormal oxygen extraction, 90 per cent had clinically demonstrable angina pectoris.

Dr. Gorlin also discussed pharmacology and physiology as they pertained to the various vasodilators and work suppressors of the heart in relation to coronary artery disease with angina pectoris. Data from the various laboratories are confusing. There are divergence of findings and differences of interpretation in regard to the vasodilators and work suppressors commonly used in clinical medicine. Dr. Gorlin stressed the discrepancy between laboratory findings and clinical impressions, and indicated that at present the physician can best follow his own clinical experiences as to the efficacy of the various therapeutic agents.

Dr. Keys reviewed the vast data that he and others have accumulated during the past 14 years regarding the epidemiology of coronary artery disease in various populations throughout the world. In summing up this vast amount of study, he concluded that the "mode of life" of the population determines or influences the fundamental disease process. He thinks that the three significant characteristics of patients with coronary disease are elevated blood pressure, excessive body weight, and elevated serum cholesterol level.

Dr. Keys pointed out that the atherogenic index seems of no more significant prognostic value than the elevated serum cholesterol level. He also maintains that no specific case for or against tobacco or alcohol in relation to coronary artery disease can be made at this time or any definite conclusions drawn.

Medical Therapy

A Panel Discussion

Raymond D. Pruitt, M.D., Houston, Moderator
Charles Friedberg, M.D., New York
George Griffith, M.D., Los Angeles
William Likoff, M.D., Philadelphia

Dr. Friedberg voiced the opinion that the biggest advancement in the modern day therapy of coronary heart disease is the use of anticoagulant therapy, and, parenthetically, the most retrograde factor is the use of long-acting nitrates. Dr. Griffith believed that aside from anticoagulants, the introduction of the mono-amine oxidase inhibitors is the next most important advance. Dr. Likoff stated that secondary in significance to anticoagulants is the realization that an individual with coronary disease who suffers a myocardial infarction is able to carry on an active life and is not permanently disabled.

There was unanimity of opinion that anticoagulants should be used after an acute myocardial infarction. There are more than 60 series throughout the world, including several from countries behind the "Iron Curtain," with practically uniformly consistent observations that the mortality rate is lowered with the use of these therapeutic agents. Why this is so is not completely known.

It was also agreed that the long-term use of anticoagulants is indicated in the patient who has coronary artery disease and who already has had a myocardial infarction. This problem is more difficult to analyze. There are, however, three excellent series: that of Björk of Sweden, Manchester in this country, and that of the British Working Party, all of which show a remarkable difference in favor of anticoagulant therapy. All show a reduction in the incidence of recurrence of myocardial infarction, and a reduction in the over-all mortality rate. The question logically arises that if the anticoagulants are useful in the prevention of recurrent myocardial infarction, why limit their administration to patients who have already had a myocardial infarction. Although this is a thought provoking problem, there are many practical difficulties in this approach at present, which may, in time, be solved.

Dr. Likoff stated that in his radioactive fat tolerance studies, anticoagulants were the only drugs that had a profound effect on the error of fat metabolism. Heparin had the most pronounced effect and the oral anticoagulants, the next greatest. Of the oral anticoagulants, Coumadin was believed to be superior, and it was stressed that the "weekly dose" was the important one, not the "daily dose." Further, it was suggested that after a week to 10 days, a weekly dose schedule could be found. Daily prothrombin time determinations only serve to confuse the estimated dosage.

There was divergence of opinion as to the value of the mono-amine oxidase inhibitors. Two of the three panelists (Drs. Griffith and Friedberg) were favorably impressed with their usage in the relief of angina pectoris. The other (Dr. Likoff) expressed a diametrically opposed view. Those in favor thought that use of these agents was the greatest new aid in drug therapy in the management of the anginal patient. It was stressed that both the type of the mono-amine oxidase inhibitor and its dosage must be "tailored" to the patient. Some of the guides suggested were as follows: The blood pressure of the patient must be measured at each visit, both in the supine and standing positions. Liver function tests, including transaminase determinations, should be made every week in the beginning of therapy, then every month. The patient must be questioned at every visit concerning dizziness, dry mouth, and evidence of liver dysfunction. The mono-amine oxidase inhibitors should never be given to a patient with a history of hepatitis, nor to any patient who is taking any other drug which might be hepatotoxic, such as a phenothiazine derivative.

Dr. Griffith discussed the clinical aspects of coronary artery disease, including the diagnostic approach. His remarks were based on experience with approximately 12,000 patients with coronary artery disease admitted per year to the Los Angeles County Hospital. Average mortality rate of these patients is approximately 54 per cent. Dr. Griffith emphasized not so much the coronary artery disease attributable to atherosclerosis but unusual forms of the disease he observed, including those of congenital origin. This latter category included patients with absence of one or more coronary arteries, origin of the left coronary artery from the pulmonary artery, congenital aortic stenosis, and coarctation of the aorta with bicuspid aortic valve.

Dr. Griffith remarked that angiitis of the coronary arteries may also occur in rheumatic fever and allied diseases. This may be a cause of sudden death in patients with these diseases. In young patients with the aortic arch syndrome, involvement of the coronary arteries by infiltration may produce coronary insufficiency. This may also occur in lymphoma and coccidioidomycosis. Coronary insufficiency may also result from Buerger's disease or thromboangiitis obliterans in the coronary arteries. Syphilitic aortitis of the coronary ostia, common in the past, is becoming rare. In syphilitic aortitis, probably the most

common cause of angina and coronary insufficiency is not direct involvement of the coronary arteries but the poor coronary flow produced by aortic valvular insufficiency.

Dr. Griffith believes that coronary artery disease of the more usual sort caused by atherosclerosis should be classified into (1) angina without clinical evidence of coronary stenosis, such as positive results of the exercise test; (2) coronary insufficiency (angina with a normal or abnormal resting electrocardiogram and positive exercise electrocardiogram); and (3) myocardial infarction.

Dr. Griffith emphasized the importance of treating the patient who has progressively increasing angina with rest and anticoagulant therapy to preclude coronary occlusion and myocardial infarction. When no anticoagulants are used in the treatment of patients with manifestations of coronary insufficiency or myocardial infarction, there is an incidence of approximately 45 per cent of thromboembolic complications. In Dr. Griffith's experience, anticoagulant therapy has reduced this incidence to approximately 15 per cent. Other complications of acute coronary insufficiency with acute myocardial infarction include congestive heart failure, shock, myocardial rupture, severe and dangerous arrhythmias, and the shoulder-hand syndrome. The incidence of rupture does not seem to be influenced by anticoagulant therapy.

Prevention of complications seems to depend on treating all patients with acute myocardial ischemia vigorously from the beginning. This treatment should include immediate physical rest, administration of narcotics to ease apprehension, and immediate use of anticoagulants. The first 3 hours after a myocardial infarction seems to be the most critical period for the institution of treatment if complications are to be prevented. Patients with angina pectoris and the syndrome of impending myocardial infarction should be treated essentially the same as those with acute myocardial infarction. The patient with impending myocardial infarction syndrome, however, is kept at rest only until he is pain free or until angina abates considerably. Anticoagulant therapy is usually continued until he is fully ambulatory, and in many cases Dr. Griffith continues to give daily subcutaneous injections of heparin. In any patient with severe angina, an attempt should be made to determine the cause of coronary insufficiency, such as atherosclerosis, angiitis, or other cause mentioned previously so that appropriate treatment can be instituted. In the metabolic diseases such as myxedema, hyperthyroidism, diabetes, hyperlipemia, or hypercholesterolemia, appropriate treatment should be initiated as soon as the diagnosis is made. In hypercholesterolemia, treatment is based mainly on diet, but administration of nicotinic acid and Triparanol may be indicated in properly selected cases. Certain of the thyroid analogues may also be useful.

In patients with acute myocardial infarction, anticoagulant therapy should be continued for at least one year after the acute episode. Dr. Griffith reported his experience with 120 physicians who have taken a daily dose of heparin (100 mg. subcutaneously) for as long as 7 years. All had had previous vascular accidents, but since the institution of heparin therapy, only one has had a thrombotic episode.

Dr. Griffith reviewed the problem of sudden death in acute myocardial infarction and the possibilities of preventing it by various means of cardiac resuscitation. From a practical standpoint, he believed that the closed chest method of cardiac massage developed at Johns Hopkins probably should be attempted in all patients who die suddenly. Patients with frequent premature systoles should probably receive quinidine prophylactically. Those with paroxysmal tachycardia and hypotension should be treated with pressor amine and intravenous procaine amide.

Dr. Likoff discussed newer diagnostic techniques, including coronary arteriography. He emphasized that coronary artery disease may be adynamic—that is, arterial disease exists but there are no physiologic or clinical manifestations—or dynamic—that is, physiologic or clinical sequelae are present. The former type may often be diagnosed only by coronary arteriography, whereas the latter is usually discovered by more common diagnostic methods. However, coronary arteriography is useful in the more manifest dynamic form in quantitating the amount and distribution of arterial disease. In extensive and widespread coronary atherosclerosis, for example, the only clinical manifestation may be one small nontransmural myocardial infarction. Conversely, a patient with one localized area of coronary atherosclerosis may have a large and even lethal transmural myocardial infarction from occlusion of this artery. Other factors which influence the altered pathophysiology produced primarily by coronary atherosclerosis include the anatomic distribution of the coronary arteries in a specific heart and the rapidity, location, and extent of the coronary occlusion.

Dr. Likoff stated that in its present state of development, coronary endarterectomy is not a satisfactory procedure because of its high risk. He thought that microscopic surgical procedures of the coronary arteries, which currently are being developed, may offer some hope for relief of coronary stenosis attributable to atherosclerosis.

Comprehensive HEPARIN Therapy in Coronary Heart Disease

LESTER M. MAY, M.D.

HEPARIN, one of the great bodily substances, has helped to produce revolutionary advances in many fields of medical and surgical research, as well as having saved innumerable lives in clinical medicine and surgery.

It is in many ways comparable to insulin. For instance, Dr. Charles Best did some of the important pioneer work on both heparin and insulin.[1] Like insulin, heparin is one of the few pharmacological products which has merited international standardization. It must be administered parenterally. It is in prolonged competition with certain orally administered drugs that are generally less physiologic, less effective, more toxic, and cheaper. However, coexistence and cooperation are possibilities worth exploring in the medical world.

There is, no doubt, a need for a good oral drug for long-term anticoagulation. Heparin remains almost in its original form, and its usage grows broader while other drugs continue to rise and fall in popularity.

History

The discovery of heparin by Dr. Jay McLean is a classic in the history of modern medicine.[1] After at first failing admission to the second year medical class at Johns Hopkins in 1916, Dr. McLean was admitted as a laboratory student of Dr. William Howell. His assigned problem was to extract phosphatides from brain tissue with ether and alcohol, and to test these phosphatide extracts as blood coagulants. He was seeking a blood coagulant, and failed to find it in brain, heart, or liver tissue. Out of curiosity, he repeated his negative results, and discovered that liver tissue extracts not only lacked coagulant power, but actually retarded blood coagulation.

Chemistry and Physiology

According to Dr. Eric Jorpes,[1] heparin belongs to a group of natural substances called mucopolysaccharides which contain hexosamine glucuronic acid esterified with sulfuric acid. These hexuronic acids occur widely in nature, having been found in molluscs and sea urchin eggs. Perhaps a cheaper natural source of heparin will be found (as in the case of cortisone). Practical chemical synthesis has not been accomplished. A highly purified crystalline heparin, prepared mainly from beef lung or hog intestine, has become available recently as concentrated aqueous sodium heparin, 20,000 units or 200 mg. per cc. The author has used this preparation for several years in a relatively small series of cases and in all phases of coronary artery disease.

The location of heparin in the mast cells of Ehrlich was made by Holmgren of the Stockholm group in

The author advocates wider usage of heparin in all phases of coronary artery disease and short-range usage in pulmonary thrombosis, embolism, or infarction associated with acute or chronic coronary disease. The literature is reviewed and the author makes some therapeutic suggestions.

1936. According to Wilander, heparin is stored in the cytoplasm of these cells as basophilic granules.[2] Ehrlich's cells occur in the reticuloendothelial system in clusters around the minute blood vessels of tissues which yield high amounts of heparin, especially Glisson's capsule (which contains ten times more heparin than liver), lung, muscle, liver, and intestinal wall. Smaller quantities are found in spleen, heart, thymus, and lymph nodes. Mellanby[2] suggests that the significance of heparin in tissues is that it serves as a local anticoagulant, preventing the blood clotting in small vessels. Curiously, heparin in flowing blood occurs in minute quantities except in anaphylactic shock. However, Engelberg has demonstrated experimentally that these minute quantities of heparin in normal flowing blood are biologically active.

Recently, Kirk demonstrated anticoagulant activity of cattle aorta *in vitro*, and he related this to data showing that human aortas contain heparitin sulfate.[10] It may be that heparin exerts its main physiologic effect by acting as an anticoagulant at the vascular wall interface, maintaining the so-called "zeta potential" charge of negative electrons and negative ions at the interface between blood and vascular endothelium. Notably, aortas of children contain more heparitin than the aortas of adults.

Pharmacologically, heparin, an electrically negative acid and the strongest organic acid in the body, rapidly neutralizes basic electrically positive protein coagulants (thrombin, prothrombin, thromboplastin), but does not destroy them. It thereby forms an easily reversible amphoteric protein heparinate neutral buffer.[21] This is a physicochemical acid-base reaction that is rapidly reversible—in contrast to the coumarins, which chemically destroy prothrombin slowly. The latter require liver cells to manufacture new prothrombin from vitamin K—also a relatively slow process.

Coronary Artery Disease

Frequent or "routine" use of anticoagulant drugs in treatment of patients with acute myocardial infarction has resulted in a decreased mortality and a lessened incidence of thromboembolic complications. It is customary to begin therapy with heparin as soon as the diagnosis is made or suspected. Former President Eisenhower, for instance, was given an immediate intravenous injection of heparin when first seen in the emergency period. Since heparin's anticoagulant action is nearly immediate, whereas the oral coumarins usually require several days for an adequate lowering of the prothrombin activity, heparin is usually started at once and continued for 2 to 3 days. Engelberg presents evidence[5] that heparin should be continued perhaps for the entire period in which an anticoagulant effect is desired. Nichol has noted the clinical impression of his group[16] that the longer heparin is continued in the therapy of acute myocardial infarction before oral anticoagulants are given, the better are the results obtained statistically.

The present availability of concentrated aqueous heparin (200 mg. per cc.) has simplified its administration. When given daily in subcutaneous average doses of 250 mg. to 350 mg., it has a painless, rapidly effective, and prolonged action for approximately 24 hours. It is the author's experience that in the first 48 hours after the onset of severe angina pectoris, severe acute coronary ischemia, or suspected, impending, or actual myocardial or pulmonary infarction, slightly higher doses are sometimes necessary. A suggested dosage is 350 mg. stat. intramuscularly, then 200 mg. every 12 hours for several doses. The average is 250 mg. to 350 mg. daily for the acute clinical period (Tables 1 and 2).

Using the generally accepted Lee and White coagulation test, heparin has an extraordinarly wide therapeutic, safe, effective, or prophylactic range, as contrasted with the narrow safe prophylactic range of the coumarins. Engelberg's stated prophylactic range is 15 minutes to 1 hour. This contrasts dramatically with the coumarins, where a decrease in prothrombin activity to less than 10 per cent may be followed quickly by serious cerebral, myocardial, or

other hemorrhage. Hence, in the hospital patient, Lee-White coagulation tests are usually not a daily necessity nor a daily expense, as are the daily hospital prothrombin tests. The Quick prothrombin test is aptly named: it can quickly get out of bounds with coumarins. This happens much less often with heparin.

TABLE 1.—*Daily Heparin in Acute Myocardial Infarction.*

Name: Pt. G. G. O→

Date	Lee-White (min. - sec.)	(Normal 5-15 minutes)	Heparin-Aq. Conc. (mg.)
11/25/59	11 - 12		300
11/26/59	18 - 24		250
11/27/59	26 - 28		150
11/28/59	15 - 20		300
11/29/59	18 - 20		250
11/30/59	22 - 22		300
12/1/59	31 - 34		275
12/2/59	35 - 31		250
12/3/59	28 - 33		250
12/4/59	Not Done		250
12/5/59	33 - 58		225

TABLE 2.—*Daily Heparin in Acute Myocardial Infarction.*

Name: Pt. H. S. O→

Date	Lee-White (min. - sec.)		Aq. Conc. Heparin (mg.)
11/22/59	13 - 13		200
11/23/59	22 - 40		300
11/24/59	24 - 20		250
11/25/59	32 - 28		200
11/26/59	39 - 24		150
11/27/59	23 - 40		200
11/28/59	20 - 25		250
11/29/59	22 - 20	(Note rapid unexplained fall in clotting time)	250
11/30/59	11 - 53	(Note how quick and easy to readjust to a therapeutic level)	300
12/1/59	24 - 39	(This would be more difficult and lengthy with coumarins.)	275
12/2/59	28 - 40		275
12/3/59			250
12/4/59	30 - 43		275
12/5/59		OPTIMAL	275
12/6/59	27 - 0	DOSAGE	275
12/7/59			275
12/8/59	17 - 40		300
12/9/59			300
12/10/59	47 - 55	(A slightly "high" level, but not dangerous according to Jorpes and Engelberg.)	0
12/11/59	19 - 32	(Note the rapid return to normal safe levels without antidotes simply by withholding the heparin.)	275
12/12/59	15 - 59		300

From the standpoint of clinical and experimental investigations, heparin has been shown to be a superior antithrombosing agent by the following observations and studies:

1. Heparin is nature's own anticoagulant, a physiologic substance secreted widely throughout the body and widely distributed throughout the natural world; by contrast, the coumarins are highly toxic protoplasmic poisons acting on the liver.

2. Excessive proconvertin (SPCA or Factor VII deficiency) activity has been shown to exist in certain clinical states associated with thromboembolism, and may be important although it is a generally untested causative factor in thrombosis. *In vivo,* Wessler[19] found that injection of excessive convertin and proconvertin in the presence of stasis regularly initiated intravascular clotting. Heparin effectively inhibited these thromboses when the clotting time was doubled, whereas oral drugs decreasing prothrombin activity up to dangerous levels had no effect on intravascular clotting due to excessive SPCA. Wessler[19] then studied intravascular clotting in isolated venous segments of dogs and, at the Second World Congress of Cardiology in Washington, D. C., in 1954, presented his conclusion that the anticoagulant action of heparin is superior to that of the coumarins.

3. Heparin is a strong antilipemic agent, a property not possessed by the oral anticoagulants, and perhaps this is its greatest advantage. Many studies[5] have shown that heparin's antilipemia clearing factor (a) decreases the excessive intravascular platelet adhesiveness that occurs in vascular thrombosis; (b) decreases plasma viscosity; (c) accelerates intravascular fibrinolysin enzymatic activity; (d) decreases abnormal red cell aggregation, adhesion, and sludging; (e) increases the low oxygen tension in ischemic myocardia of dogs; and (f) improves the ballistocardiogram and electrocardiogram[6] of anginal patients. The coumarins do not confer these benefits to a comparable degree.

Additional properties may provide miscellaneous adjunctive benefits to myocardial infarction patients. Heparin has been shown to inhibit experimental pulmonary edema.[12] Heparin decreases the incidence of irreversible shock in dogs.[4] Myocardial contractility is increased by heparin and decreased by the coumarins.[8] Finally, with the electron microscope, heparin has been shown to function in the formation and repair of collagen fibers and endothelial intercellular cement[14]—important elements in the healing of infarcts.

On the basis of these findings, the author has used heparin in a small series of cases as the sole

daily anticoagulant in the following conditions:

1. severe angina pectoris and status anginosus (2 cases)
2. acute coronary insufficiency (4 cases)
3. acute myocardial infarction (4 cases)
4. mild angina occurring as a sequel to acute myocardial infarction (3 cases)
5. asymptomatic status postmyocardial infarction (4 cases) (200 mg. aqueous concentrated heparin two to three times per week plus daily coumarin).

The author's clinical impression is that all these cases have done well. The series is too small to be significant statistically, and there is no detailed study in the literature covering a similar comprehensive but much larger series. However, Engelberg has recently published a brief pilot study of 100 cases of acute myocardial infarction treated with heparin[5] for 3 to 4 weeks, as contrasted with 63 cases of acute myocardial infarction treated by heparin for 2 to 3 days and then Dicumarol for 3 to 4 weeks. In patients receiving heparin alone, the mortality rate was 28 per cent; in patients receiving heparin plus Dicumarol, the mortality rate was 38 per cent. More significantly, in seriously ill or "bad risk" patients who had myocardial infarctions with three or more complications on admission, the mortality rate with heparin, then Dicumarol, was 58 per cent. With heparin alone the mortality rate dropped to 23 per cent—an impressive statistical difference.

Pulmonary Infarction

According to Crane,[3] and others who have studied large series of cases, heparin is the drug of choice for treatment of suspected, impending, present, or recurrent pulmonary emboli. In the presence of acute coronary injury, pulmonary infarction may be a precursor, accompaniment, or sequel to the coronary attack. Castleman[17] has emphasized the frequency of undiagnosed and untreated pulmonary emboli, often multiple, and often cardiac in origin or resulting in coronary insufficiency. In 351 routine autopsies, Hunter[9] found that 15 per cent had pulmonary emboli; 10 per cent were classed as nonfatal, and 5 per cent as fatal. McLachlan and Patterson[13] state that in cardiac patients with pulmonary infarctions, 25 per cent arise from right-sided mural thrombi. In so-called "terminal pneumonia" and other intractable pneumonias, it is not uncommon for the pathologist to show the clinician pulmonary thrombosis or infarction as the source of the trouble. Whenever pulmonary infarction is a strong clinical possibility—and such is often the case in serious acute coronary disease—the clinician should consider matching rapidly acting heparin against possibly rapidly catastrophic pulmonary infarction.

Ambulatory Coronary Patients

Many plans have been reported for prophylactic long-term management of coronary patients. Wright's[21] plan consists of oral maintenance coumarinization at a "safe" range of prothrombin activity. His plan is widely used. Engelberg[7] has devised and reported an alternative plan in which he recommends an antiatherosclerotic dose of heparin of 200 mg. twice a week for ambulatory prophylaxis of postcoronary occlusion cases. The rationale of each plan is different, but the results are surprisingly similar. Each plan has been reported to reduce postcoronary mortality from approximately 18 per cent to approximately 4 per cent over a 2 year period. Interestingly, Morrison's[15] plan, using a rigid (25 Gm.) low fat diet, produced a similar reduction in coronary mortality to 4.7 per cent over a 3 year period. The author has devised and has been using a fourth plan which combines the advantages of Plans 1, 2, and 3, in a small series of cases. The rationale of Plan 4 is to seek the arrest of thrombosis by oral coumarin (Wright), and to seek the arrest of atherosclerosis by intermittent heparin (Engelberg) and by proper diet (Morrison). The practical difficulties here of long-term management sometimes cause, not so much the arrest of the disease as the arrest of the physician in his therapeutic pilgrim's progress. No significant or dangerous reduction of prothrombin activity (to 10 per cent or lower) was found when the author combined aqueous concentrated heparin, 200 mg. twice weekly, with daily coumarin maintenance for long periods of time. Clinically, in a small series (4 cases), patients on this combined plan have all done well, with no bleeding or recurrence of cardiac symptoms. Because of the reported striking reductions in mortality of the individual Plans 1, 2, and 3, I believe that their combination in Plan 4 deserves further trial in a larger series, in the hope that mortality will be further reduced (Table 3).

Relative Toxicity

Coumarin's main action is to produce the iatrogenic hemorrhagic disease state of hypoprothrombinemia. Castleman has illustrated this point well in his study[18] of fatal hemorrhagic pericarditis, hemopericardium, and ventricular rupture occurring in the course of coumarinization of patients with acute myocardial infarctions. Castleman found at autopsy a two-fold increase of fatal myocardial rupture (19.7 per cent) and a three-fold increase of significant hemopericardium (14.1 per cent) in patients who received oral anticoagulants over those who did not. As a commentary on the toxicity of coumarins, 34.4

TABLE 3.—*Combined Heparin and Coumadin Ambulatory Therapy.*

Typical laboratory report with pt. on maintenance daily coumadin, alternating 5 mg. with 7.7 mg. as daily dosage, plus 200 mg. aqueous concentrated heparin twice weekly, according to Plan 4. Tests taken 4 hrs. after injection of 200 mg. aqueous concentrated heparin.

Pt. W. O. O→	
4-11-60 Prothrombin:	35% concentration
Patient:	22 sec.
Control:	15 sec.
Lee-White Coagulation Time:	25 minutes

(Because of relative stability of results, above tests have been made at 2 to 3 week intervals during past 9 months postcoronary ambulatory period. Typical range of prothrombin activity has been 20% to 30%; typical range of Lee-White coagulation time has been 20 to 35 minutes.)

per cent of the autopsied hemopericardia in acute myocardial infarctions occurred at "therapeutic" prothrombin levels; 25 per cent of the hemopericardia occurred with prothrombin activity above 30 per cent. The author has found no reports of hemorrhagic pericarditis, hemopericardium, or myocardial rupture occurring with heparin as the sole therapy in the acute phase of myocardial infarction.

Approximately 125 cases of hemorrhagic deaths reported by 1950 were due to anticoagulants; two of these were associated with heparin therapy, the remainder with oral anticoagulants. An editorial in the *Journal of the American Medical Association* (Dec. 23, 1950) concludes from these statistics that the risk of hemorrhage is less with heparin than with oral anticoagulants.

Statistically, the risk of fatal hemorrhage would seem to be about 60 times less with heparin than with coumarins. Recent wider and and more prompt usage of oral vitamin K-1 (Mephyton) has probably improved these statistics.

The literature contains a few reports of serious anaphylactic reactions to intravenous heparin. Some of these reactions have been attributed to impurities and these reports have become rare with increasing purification of the product. In allergic individuals, particularly those with a history of asthma, skin tests should be made and heparin given with caution, especially in regard to intravenous administration. The author believes that intravenous administration of heparin is rarely necessary in treatment of coronary disease. Alopecia and local petechiae and ecchymoses at the site of injection or at the site of peripheral thromboses are rare minor reactions to heparin. Using a No. 24 half-inch hypodermic needle, concentrated aqueous heparin sodium should be injected subcutaneously. It is almost painless, as compared to the old painful intramuscular Depo-Heparin.

Regardless of the relative merits of heparin and coumarins, the important point is that each probably becomes dangerous when the prothrombin activity is depressed to 10 per cent or below. It is at this level that the hemorrhagic disease of hypoprothrombinemia usually manifests itself. Either or both drugs can produce this 10 per cent level, but the coumarins do this more frequently than heparin because of the narrower range between their therapeutic and toxic doses, and because of their cumulative and relatively slow onset and offset of action. The important practical point in acute myocardial infarction is that when the 10 per cent prothrombin activity level occurs, proper antidotes (oral Mephyton, 40 mg. stat., if patient is asymptomatic; or intravenous Mephyton, 75 mg. stat., if bleeding is suspected) should be given immediately to bring the prothrombin level rapidly back to a safe range. Otherwise serious or fatal infarctional bleeding may occur while the prothrombin activity is at 10 per cent or less.

Experimental evidence favoring this clinical concept may be found in Whisnant's[20] recent work at the Mayo Clinic on cerebral infarction in dogs given coumarin anticoagulants. Two dogs with prothrombin activity of less than 5 per cent had gross hematomas in their experimental cerebral infarcts. Four of the dogs died, two with gross intrainfarctional and intraventricular hemorrhage, and two with massive gastrointestinal hemorrhage; all of these dogs had prothrombin activity of less than 5 per cent. Serious or fatal hemorrhage, then, can occur with either heparin or coumarins from overdosage, taking a 10 per cent prothrombin activity, or less, as a good general laboratory sign of impending or present overdosage. Intravenous or oral Mephyton (vitamin K-1), as advocated more than 20 years ago by Professor Karl Link,[11] serves admirably to counteract coumarin overdosage. Intravenous Polybrene (0.9 mg. per mg. heparin) in 500 cc. of 5 per cent glucose in distilled water given over a 45 minute period, serves to bring about physicochemical neutralization of excessive heparin, to restore normal clotting time, and with vitamin K-1, to reelevate a dangerously

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low prothrombin per cent activity test. In actual medical and surgical practice, heparin in therapeutic doses rarely depresses the prothrombin activity to potentially hemorrhagic levels, whereas coumarins relatively often do this—depending, of course, to some extent on the skill and knowledge of the individual therapist. In general, anticoagulants should be used with extreme caution or, better, not at all, in subacute bacterial endocarditis, renal insufficiency, brain or cord surgery, ulcerative lesions (especially gastrointestinal), blood dyscrasias, serious hepatic disease, appreciable diastolic arterial hypertension, and any bleeding tendency. Before starting heparin, a platelet count should be taken, and prothrombin activity and Lee-White clotting determined. If the platelet count is low, anticoagulants should be given with extreme caution or withheld entirely.

Summary

1. Considering its well-documented advantages, numerous physiologic benefits, prompt efficacy, antilipemic effects, wide therapeutic range, low toxicity, infrequency of hemorrhagic complications, and rapid onset and offset of action, heparin deserves more consideration in all phases of coronary artery disease —angina pectoris, status anginosus, acute and subacute coronary insufficiency, myocardial infarction (especially if severe) and in ambulatory status post-myocardial infarction.

2. Heparin also deserves consideration as short-range therapy in the face of possible, threatened, doubtful, present or recurrent pulmonary thrombosis, embolism, or infarction associated with acute or chronic coronary disease.

3. In long-range therapy (more than 3 weeks), heparin may be used according to the Engelberg method of 200 mg. of aqueous concentrated heparin two to three times per week, either alone or as a supplement to maintenance coumarinization. Conclusive statistics on the best long-term therapy await larger series and more years of study. In the meantime, the author has combined the different but distinct benefits of the two methods of long-term ambulant therapy, as outlined by Wright and by Engelberg, whenever the patient's cooperativeness and financial status have permitted what appears to be possible optimal therapeutic approach. Addition of the proper diet [low fat (?), unsaturated fat (?), low protein (?), low calory (?)], to long-term coumarin and intermittent heparin eventually may almost eliminate coronary mortality.

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In an injury to a muscle or tendon, the entire musculotendinous unit is affected. The examiner who attempts to isolate the two types of injury may lose sight of the primary factor involved: restoration of the muscle function. Early recognition of the initial condition, with proper definitive treatment, may help to prevent disability in many cases.

Injury to the Musculotendinous Unit

IN INJURIES to the muscles and tendons, the entire musculotendinous unit is involved. Thus, interference with the function of either the muscle or the tendon has the same general effect: loss of effective use of the particular unit. If the physician attempts to isolate the conditions and speaks of injuries to the muscles in one category and of tendons in the other, he is apt to lose sight of the primary factor involved—restoration of the muscle function. It is proper in this discussion to consider possible injuries to various portions of this unit.

Strain

Strain is defined as damage to a tendon or muscle occasioned by overuse or overstress. It is important to distinguish between strain and sprain by applying the term "strain" to muscle and tendon, and "sprain" to ligament. Strain of a tendon may consist of anything from minor irritation of the sheath to nearly complete avulsion of the tendon from its attachment or within its substance. Applied to the muscle, it includes cases of overuse and overstretch short of rupture, either from a forcible avulsion or from a direct blow. In the ordinary strain, there is no appreciable hemorrhage, pathologic findings being confined to a low grade inflammatory reaction with swelling, edema, and disruption of the adjacent fibers.

Diagnosis will depend upon testing the function of the muscle involved and seeking the location of the pain. This will be relatively easy early, and becomes obscure when the whole muscle is in spasm. Careful localization of the injury is important if local measures are to be used. These may be of considerable value in many cases. The principles of treatment are rest, protection from stress, local heat, and local injection (Xylocaine and Hydeltra). Careful attention must be given to control of the resumption of activity, since strain tends to recur. Any muscle in the body can be involved in a strain. The amount of protection applied should vary with the degree of damage. In some cases it may only be necessary to limit the patient's activity, whereas in others all stress must be prevented by immobilization, either of the patient or the part.

The exact location and function of the unit involved has a great deal to do with the importance of treatment. It is much more difficult to prevent strain in a muscle which must be actively overused in some particular sport. For example, in a football player strain of the hamstrings, quadriceps, or calf may be completely disabling. In a baseball player strain of the muscles of the throwing arm may completely prevent participation at his usual position. The many complications of simple strain, to be discussed later in this article, are, of course, the most important factors in the decision as to further participation of the particular player.

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In essence, treatment consists of relieving the acute condition by local injection with Xylocaine or Cyclaine, followed by administration of Hydeltra or Hydeltrasol, use of local heat, and protection against any movement which causes pain. The criterion for the degree of protection is pain. Function should be resumed just as soon as possible, but must be pain free. The man with a strain of the hamstrings may exercise his leg in the whirlpool in the earliest stages, whereas running would be injurious to his recovery. One is constantly torn between the desire to rehabilitate the muscle by active use and the knowledge that overuse will cause recurrence. It takes an extremely far sighted physician or trainer to regulate the activities to that fine point which will restore the player at the earliest possible moment.

Injuries to the musculotendinous unit caused by a single, violent injury may be of any degree. The tendon may be torn from the bone, or may be pulled in two. The musculotendinous junction may be ruptured, or the muscle may tear. These injuries result from either violent contraction of the muscle against resistance, as with the sprinter coming out of the blocks, or violent overstretch of the muscle while it is forcibly contracted, as with a rupture of the biceps muscle which occurs when the arm is forcibly extended from a flexed position, with the biceps taut. Certain areas of the body are particularly prone to these injuries, such as the hamstrings (Fig. 1), the biceps humerii (Fig. 2), and the plantaris. The examiner should be extremely particular in his diagnosis of a musculotendinous injury to determine, if possible, whether or not the unit has been completely severed. If this condition is recognized early, the results of surgical repair are gratifying, whereas later, repair may be almost impossible.

If injury is less than complete, an attempt should be made to evaluate the degree of the tear and to give treatment accordingly. Rupture of muscle fibers with hematoma, strain of the attachment of the tendon to the bone, and partial separation of tendon from the muscle are possibilities. Since careful observation, physical therapy, and protection are indicated in all of these, the length of time protection is required is determined by rapidity of recovery. In cases, for example, in which the tendoachilles is partially torn from the soleus muscle, localized tenderness with persistent spasm on active use of the soleus is a danger signal. It indicates that immobilization should be continued long enough to allow healing to occur, 6 to 8 weeks. Actually, limited function of the muscle can be initiated before this time provided it remains pain free. As is the case in so many instances in the treatment of athletes, it is extremely important to analyze the symptoms and determine the exact condition since early treatment is highly satisfactory. Late treatment is, at best, a salvage procedure.

Muscle Cramping

Muscle spasm or cramping is a frequent complaint of athletes. It has many causes. Many conditions which are called muscle spasm or cramping are the result of disease. Actually, etiology and pathology seem to be inextricably combined. Many common injuries cause spasm of the muscle. Some of the more common instances are a blow to the muscle causing slight infiltration of blood, overstretch of the muscle causing rupture of some of the fibers and strain, and overcontraction of the muscle. These all injure the muscle unit. There are many cases, however, in which the muscle cramp or spasm appears to be an entity. One of the most common and dramatic of these is the severe cramping of the calf which occurs when the athlete has apparently been entirely normal, going at full speed, and suddenly gets a violent contraction of the calf which pulls the foot down into equinus with severe cramping pain. Indeed, this may come on when exertion is minimal, at least insofar as any overuse of overstretch is concerned. There are several causes of this condition, some of which are remediable. Reduction of salt by overperspiration will cause a condition in which the muscles of the body are subject to cramping. Cramping may also

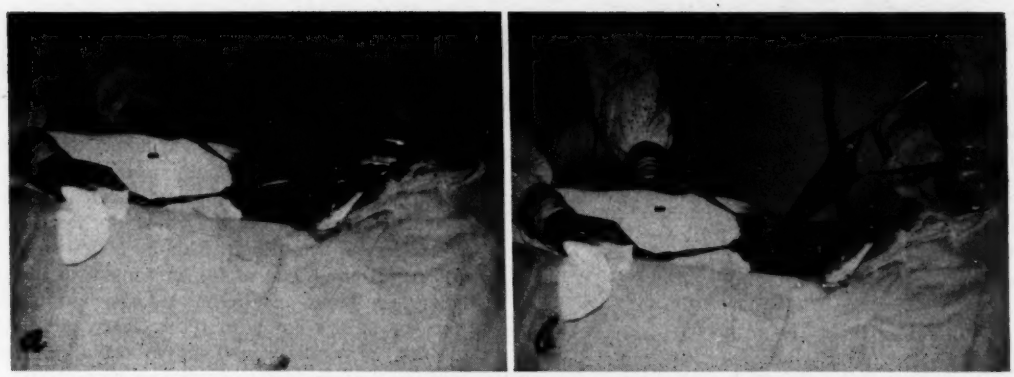

Fig. 1. Athlete gave history of "pulled muscle" of thigh after hard running, and was told to "work it out". At operation 6 months later, there was complete avulsion of upper end of semitendinosus muscle so that its upper end was fastened down only by the neurovascular bundle, which is held in the lower forceps. Contracture of this muscle was not only ineffectual, but caused traction on the nerve and pain. Many months after rupture, the only procedure possible was to remove the muscle completely; patient had uneventful recovery.

a. Bunched up muscle lies in operative wound; incision was made through posterior surface of thigh.

b. Neurovascular bundle is severed permitting muscle to be picked up. Coned off upper end of avulsed muscle should be noted.

result from changes in temperature, from sudden chilling, or even from sudden overheating. Dietary considerations are sometimes important. Many of these factors can be handled in an adequate training program. Metabolic causes will require more emphasis on prevention than on cure.

In another category are those cases in which there is impairment of circulation to the part. Frequently the cuff of the pants leg is too tight around the calf, or the calf muscle has been strapped circumferentially in such a way as to interfere with its blood supply. There is no actual disease in the muscle other than rapid build up of muscle waste products and diminution of oxygen supply. Overfatigue may cause cramping for much the same reasons as does constriction.

With exclusion of these potential causes for cramping, there still remains a group in which there is no specifically recognizable cause for the condition. In most cases the player has had no preliminary symptoms, the muscle jumps into intractable spasm, and the player is rendered helpless both by pain and restriction of motion. Examination will elicit nothing other than the contracted muscle. The muscle is not particularly tender, and there is no swelling or edema. One should suspect muscle spasm when sudden severe pain occurs in any muscular area of the body. This is particularly prevalent in the neck, back, hamstrings, and calf. The fact that it is so much more common in weight bearing portions of the anatomy may be of significance as this type of cramping is relatively infrequent in the upper extremities.

Treatment is usually simple and in the majority

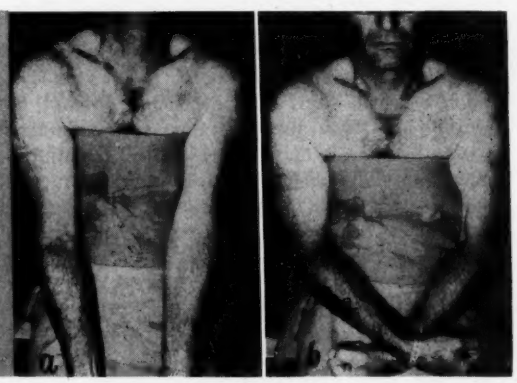

Fig. 2. Patient fell from drilling rig, being caught by left arm with elbow flexed. Immediate pain was in front of elbow, and patient had persistent pain and disability on use of this arm. One month after injury, biceps muscle had traveled upward and bunched up on contraction against resistance, as indicated in: (a) arm with biceps relaxed; (b) arm with biceps contracted. Two sides can be compared.

One month after injury, tendon could not be sutured to radial tubercle; therefore, it was pulled down and fastened to tendon of brachialis anticus. Two months later, patient had not regained complete extension, but had no pain and had biceps function.

of instances can be taken care of by the player. His immediate instinct is to apply local pressure to the spastic muscle and to try to force it through a normal range of motion. The player will sit on the ground and grab his calf firmly with one hand while he dorsiflexes his foot with the other. This is often amazingly effective. The cramp may be released by simple contraction of the opposing muscle so that if there is a cramp in one flank, stretching the muscle by leaning to the opposite side will frequently relieve the tension.

If the player needs help in relaxing the spasm, the same principles apply. Steady, even, firm but atraumatic local pressure often gives dramatic relief. Relief is obtained in many instances by simple stretching of the muscle. Combination of the two methods appears even more effective. The physician should be constantly aware of the fact that he is trying to restore only a normal range of motion, and should be careful not to overstretch the muscle. In the contracted hamstring, the knee should be extended, but forceful raising of the straight leg is interdicted. If the calf is involved, the foot should be pushed up to 90 degrees but not forced into extreme dorsal flexion. For this reason these manipulations should be carefully controlled. Passive manipulation should be applied steadily and smoothly with no jerk or swing. To apply massive force with leverage against a muscle in spasm may rupture the muscle fibers, or even cause avulsion of the tendon, in which case a relatively simple condition is replaced by one much more serious. I know of no place in the treatment of any acute injury in which this type of excessive manipulative force is desirable.

The same thing can be said about massage. Massage directed toward restoring circulation to the muscle is acceptable, whereas deep kneading, pounding, or pummelling of the muscle, which is already insufficiently supplied with metabolites, can only result in harm. As the muscle spasm relaxes, relatively gentle massage in the direction of the venous flow may be useful. The muscle may be tapped gently from side to side between the two hands, with a rolling manipulation of the muscle between the two palms. Usually this cramp is relatively short lived, and the player may continue to compete although the condition is prone to recur soon. If cramping is persistent, it will require further treatment. This consists of rest of the part and application of local heat by whirlpool, warm packs, infra-red, diathermy or other modality. Inductive heat appears more effective than radiant heat.

In case of persistent muscle spasm, there may be residual soreness and aching in the muscle, and during this period forceful activity should be avoided. A carefully planned regimen of physical therapy, with gradually increasing resistive exercises within the tolerance of the patient and short of pain producing stimuli, should be carried out. Persistent symptoms following cramp may be the result of ruptured muscle fibers with edema and blood infiltration, and should be treated as such. The duration of treatment should depend upon the symptoms. The author cannot agree that the best treatment for torn muscle fibers with hematoma is immediate active use despite pain and muscle spasm.

Hematomas

The athlete is particularly prone to hematoma formation within the muscles since he regularly is exposed to the type of trauma likely to cause hematoma. For this discussion a hematoma is defined as a collection of pooled blood within a relatively restricted area; the blood maintains its identity and is not infiltrated through soft tissues. This may occur in many locations and from varying types of trauma, since the basic pathologic condition is bleeding within the tissues. By virtue of pressure from the hemorrhage, the blood makes a space for itself which it wholly fills by pushing other tissue aside. Treatment must, of necessity, vary widely according to the location and extent of the hematoma. Treatment may sometimes be directed toward its elimination. In other instances it may be necessary to relieve the hematoma because it is pressing on an adjacent structure. The general principles of treatment consist of (1) recognition of the condition, (2) protection against further bleeding, (3) evacuation of the blood, (4) encouragement of absorption of blood, and (5) protection of the part until healing occurs.

Diagnosis of a deep hematoma may be difficult, whereas that of a more superficial one may be obvious. The outstanding diagnostic characteristic, is fluctuation. In case of doubt, attempts at diagnostic aspiration are justified. Once the presence of a hematoma is confirmed, local treatment should be begun. During the preliminary diagnostic phase, before definitive treatment, pressure dressings and ice pack should be applied to prevent further bleeding. Once it is determined that there is an isolated quantity of blood present, the convalescent time may be shortened appreciably by aspiration. Surgically aseptic technique must be used, with a large (15-16 gauge) needle; old blood cannot be evacuated through a 22 gauge needle. After aspiration the area should be infiltrated with hyaluronidase. This tends to break down the confining wall and hasten the absorption of blood. The author severely condemns any attempt to aspirate a hematoma under any but the most aseptic conditions. The dressing room or indeed the

average training room is not the place for this definitive treatment since the potentialities of infection are particularly great in extravasated blood.

The center of a hematoma is, to some extent, like the center of an abscess. It may be avascular insofar as circulating blood is concerned. Many months may be required for blood to be absorbed, even in the absence of infection or other complication. Hence, if possible, the volume of blood and the size of the hematoma should be reduced. The speed of absorption may be increased by diffusion of the hematoma, and this is aided by the use of hyaluronidase and the pressure bandage. This permits more rapid absorption because of greater exposure to the circulating fluids of the body. It has been said that it is unwise to aspirate a hematoma until the physician is sure the bleeding has stopped, since increasing pressure of the hematoma *per se* may tend to discourage further bleeding. This is fallacious reasoning since the same amount of pressure can readily be applied by external means. When at an early stage, the hematoma is evacuated as completely as possible, a pressure bandage will keep more pressure on the area than intrinsic pressure from the blood alone could do.

When the area involved is a moving part, this part should be protected not only against a direct blow but also against motion, since motion tends to break down the clot within the vessels and to perpetuate bleeding. Motion also tends to cause irritation throughout the lesion and to encourage overreactive scar or calcification. Many a potential case of myositis ossificans has been aborted by careful protection of the limb after proper local treatment. It is particularly important in muscle bleeding not to employ the "work it out" technique, since this encourages further bleeding and promotes calcification. Absorption is also accelerated by heat, which tends to improve the circulation of the area.

Protection against contusion should be continued as long as the area is symptomatic. However, protection against motion may be terminated much sooner. Muscle mobility can be resumed within the limits of pain almost at once. Forcible exercise of a muscle containing a hematoma only aggravates it. In contrast, voluntary painfree contraction tends to aid absorption. The dividing line between a good level of activity and a deleterious one may be fine indeed. In many instances the athlete will minimize his symptoms in order to increase his activity. Therefore, real judgment may be required by the physician in deciding how soon full activity may be permitted.

To recapitulate:

(1) Diagnosis should be prompt, with aspiration if necessary, to make a final determination.

(2) The volume of contained blood should be reduced by aspiration and use of hyaluronidase, pressure, cold first, then heat, and controlled activity.

(3) Reinjury should be prevented by protection against direct trauma or excessive activity.

(4) Resorption should be encouraged by exposing the hematoma to a larger surface area of circulation, improving the local circulation, and maintaining the general circulation.

Excessive scar formation or calcification can often be prevented by these measures.

Myositis Ossificans

Myositis ossificans is a frequent complication of the combination of contusion and hematoma involving the muscle near its origin on bone. As is so frequently the case, this diagnosis includes several different conditions. The name implies inflammation of a muscle followed by ossification; this is infrequently the case. Much more commonly, there is ossification of infiltrated blood along the muscle origin. The condition may appear as a simple exostosis having a broad base with a sharp extension into the muscle. Thus, it seems to be a disease of the periosteum rather than of the muscle. The muscle is merely displaced by the ossifying mass. In this type of case, the cause is probably partial avulsion of the muscle fibers from the periosteum of the bone, or even more likely simple contusion of bone causing subperiosteal hematoma. In these conditions the mass is bone and is firmly attached to the parent bone. In another type of so-called myositis ossificans, there is actually a plaque of bone lying within the muscle, and separated from the bone by a layer of muscle. It is difficult to determine in this instance the cause of the ossification. The most likely assumption is that periosteal cells invade the hematoma at the time of injury, with formation of true bone rather than the metaplasia of muscle into bone.

Trauma is almost always the initiating cause of

Dr. O'Donoghue, who is professor of orthopaedic surgery and fractures at the University of Oklahoma Medical School, presented this paper before the Texas Society of Athletic Team Physicians during the Fort Worth annual session on April 9, 1960.

myositis ossificans. In the case of the long muscles, this may be repeated traumata as in the upper arm from repeated blows of the blocker in football. It may be from a single forceful blow, as exemplified by the involvement of the quadriceps intermedius in the anterior thigh. In all of these conditions, however, there seems to be one underlying factor: repeated chronic irritation of an area already damaged. If blood infiltrates the muscle and the muscle is put at rest, the blood probably will be absorbed without further complication. If the muscle continues to be irritated by active use, repeated blows, unwise manipulation, or massage, a new injury is superimposed over the early repair and the result is ossification.

Pathology. Pathologic findings are those of an infiltrating hematoma, either subjacent to bone or directly involving it. As healing occurs, instead of the orderly formation of scar to be replaced to a greater or lesser extent by normal tissue, osteogenesis occurs and the scar is transformed into bone. This may be extensive or mild, depending more upon the extent of the repeated injuries than upon the original injury. This process tends to continue as long as the irritation continues. When the part is put at rest and the blood supply is improved by local heat, ossification is arrested. In many instances the bone will be absorbed and the mass will diminish and disappear. In other instances as the bone matures, it becomes smaller and ultimately terminates as an exostosis of normal appearing bone.

Diagnosis. Diagnosis is not difficult once the ossification is mature. It is much more important to recognize impending disease. If symptoms from a bruise on the thigh or arm which has been diagnosed as a contusion with hematoma formation do not promptly resolve, the examiner should be on guard against formation of bone within the area. Hence, in the previous discussion of contusion and hematoma, the author insisted that rehabilitation be used within the limits of pain and that reactivation of the area should depend not upon chronologic time but upon the subsidence of symptoms. A roentgenogram made early will be negative but should be repeated after 2 or 3 weeks if symptoms persist. The author has seen many patients who on clinical examination appeared to have a calcified mass within the muscle. The roentgenogram revealed only a little cloudiness. Symptoms disappeared with proper management, and the result was a small flake of calcium either on the bone or in the underlying muscle. More often, there was complete resolution.

Treatment. The early treatment of myositis ossificans is preventive; there is no place for operative treatment at this stage. As the impending condition is recognized, the muscle should be put at rest. Physical therapy in the form of heat is permissible, but no passive manipulation should be done. Some active motion may be permitted within the restriction of the splint if it is painless. No painful active motion should be permitted. So treated, the inflammation should subside and the patient may become asymptomatic. There may be temporary stiffness of the part and considerable time may elapse before improvement is noted, but a crippling condition will have been prevented.

Rehabilitation. Rehabilitation should be performed well within the limits of pain, at least for the first several months. Should the patient be seen after ossification has occurred, the same treatment is instituted, namely, rest and inductive heat.

In the early stage, particularly in myositis ossificans around a long bone, the roentgenographic appearance is frequently that of a new growth, with characteristic laminations of ossification and sometimes the stellate sunray effect which simulates osteogenic sarcoma. The history of trauma should not be ignored in a patient suspected of having a bone tumor. Many such patients have been operated on for bone tumor. This is a particularly dangerous practice because biopsy of an early case of myositis ossificans shows actively growing young bone, which may be indistinguishable from a neoplasm on microscopic examination. Careful attention to the symptoms, and above all to the course of the lesion, is of value. Since myositis ossificans runs a relatively short course, at least in the expanding stage, a period of watchful waiting is justified in case of doubt. Meantime, the part should be put at rest and roentgenograms made at 2 week intervals. With myositis, there will be diminution of calcification or maturity of the margins, different from the development of an osteogenic tumor.

As myositis ossificans progresses and the bone becomes more mature, more activity can be permitted, but it must be pain free. There is no justification for passive stretching before 6 months have elapsed, and the physiotherapist or trainer must be carefully instructed and his urgency toward early rehabilitation controlled. Under the exigencies of sport, everybody is anxious to have the player rehabilitated, and may believe that the sooner the operation is performed, the quicker the recovery. This is one instance in which the reverse is true (Fig. 3 and 4). Recovery will be prompt after removal of a mature exostosis, whereas it will be indefinitely postponed by an attempt at removal of forming bone.

Tenosynovitis

Tenosynovitis is defined as inflammation of the synovium surrounding a tendon. This inflammation is usually attributable to strain from unaccustomed overuse, but may be caused by a direct blow or by

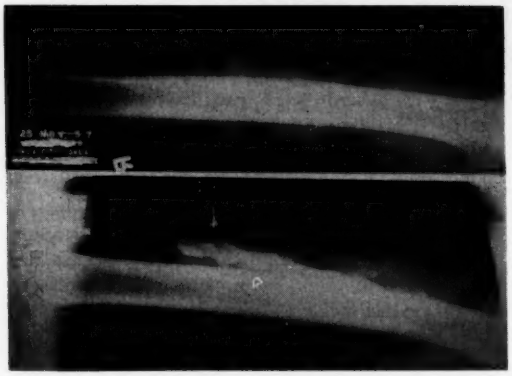

Fig. 3. Myositis ossificans. In upper preoperative view mass was obviously immature. Operation was performed only a few months after injury. Surgeon succumbed to urgency of player, coach, and parents, with result that recurrence was at least as extensive, if not more extensive, than original lesion. These masses must not be disturbed until they are completely mature.

infection. The result is a reaction of the normally avascular synovium with increased blood supply, invasion by inflammatory cells, oversecretion of synovial fluid, and increase in fibrin content causing so-called "sticky" adhesions between the tendon and its surrounding synovium. The exact manifestations vary greatly, depending upon the tendon involved. Actually, the symptoms are those which would be expected from irritation by motion of the tendon. This is first manifested by pain on function, which may progress to the point that there is constant pain even at rest. Crepitation is frequently present. As the tendon slides up and down, it adheres to the

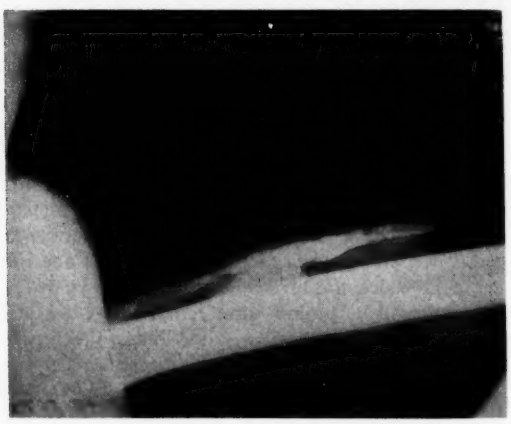

Fig. 4. Typical extensive myositis ossificans, illustrating plaques in the muscle separated from bone. Complete excision of the plaque was performed with some recurrence of mass. This is likely to happen in an area this extensive. It may be that some portion of this mass (particularly its distal end) was not entirely mature at time of removal. Proximal end and central part adherent to bone is mature.

synovium, causing "snow ball crepitation," which can be felt by placing the fingers over the involved tendon while it slides up and down. As the condition progresses, adherence between tendon and synovium becomes firmer, and it may finally result in complete loss of the gliding capacity of the tendon within its sheath. This is particularly true in areas where there is a true tendon sheath, such as the long head of biceps at the shoulder. It is not common where mesotendon is concerned, such as the tendoachilles. Treatment is directed toward the pathology, and the principles of therapy are rest, local heat, and local injection. Specific treatment will vary according to the site of the condition.

Under ordinary circumstances and with proper care, tenosynovitis will subside completely and normal function result. In certain cases, however, because of the severity of the condition, inadequate treatment, or anatomic characteristics of the area involved, complications may cause severe and permanent disability.

There are two common sequelae of acute or chronic tenosynovitis. The first is adhesive tenosynovitis. As the name implies, adhesion between the tendon and its surrounding sheath interferes with normal gliding motion of the two structures. Restriction of motion may be partial or complete. The degree of disability will depend upon the tendon involved. In an area where there is a true sheath, such adherence will prevent motion completely and the tendon loses its function. In other areas adherence may simply result in traction strain, and possibly some restriction of function. Surgical treatment for true adhesive tenosynovitis is difficult since if the adhesions are trimmed away, they may promptly re-form. However, resection of the sheath or transfer of the tendon to a less constricted area is an effective remedy.

The second type of sequela is constrictive tenosynovitis caused by thickening of the walls of the sheath with resultant narrowness of its lumen. This frequently occurs in an area where more than one tendon passes through the same tunnel or sheath. In such an instance the tendon is not adherent to the sheath, but the sheath is so tight that the tendon will not slide through it. This may show as an initial snapping, such as a trigger finger, and may terminate in complete loss of gliding power of the tendon through this tunnel. Whereas adhesive tenosynovitis is difficult to treat adequately, this constricting type is readily relieved. The tunnel is enlarged by resection of a part of the sheath.

Synovial Hernia

Another condition involving the tendon sheath, and sometimes the joint, is the synovial hernia or

ganglion, so-called. This condition, as a rule, results from some defect in the fibrous sheath of the joint or tendon which permits a segment of underlying synovium to herniate through it. In the athlete this is usually the result of a mild sprain, although it also may be degenerative in nature. The irritation accompanying herniation results in continued secretion of fluid so that the sac gradually enlarges. In some instances it reaches an amazing size. Usually, the synovial hernia is a small, discrete, sometimes extremely hard nodule, lying directly over the tendon or the joint capsule. It is often impossible to tell whether the primary involvement is tendon or joint. The consistency of the tumor may vary from that of a soft, fluctuant, obviously liquid density to the hardness of bone. This difference in consistency is more apparent than real and is attributable to the degree of tension within the sac. Uniformly the sac contains a clear, gelatinous, viscous fluid, which is blood tinged only after aspiration or recent trauma.

There are certain areas of the body which have a predilection to synovial hernia, notably the wrist. The differential diagnosis is that of the tumor mass but is not unduly difficult. Synovial hernia may be confused with a dislocated bone, such as the semilunate at the wrist. It must be distinguished from a neoplasm. Its general location, the lack of local symptoms, the consistency—all are diagnostic leads. The mass ordinarily can be transilluminated, but this may be extremely difficult because of the location of the tumor. Pain is not a notable factor. The complaint usually is like that of a sprain of the adjacent joint. There may be aching pain and aching on overuse. Often extremes of motion may cause considerable discomfort, particularly if the protrusion is recent and the sac is tight.

Treatment of a synovial hernia is essentially surgical. The mass tends to come and go, and thus may seem to respond to periods of splinting and protection or snug wrapping. This does not usually solve the problem; it merely postpones it. I have, however, known of many cases in which the ganglion has spontaneously regressed and, to my knowledge, never recurred. When it is symptomatic enough to interfere with athletic activity, it should be removed.

During surgical excision great care must be taken to remove the whole mass. The defect in the capsule or sac must be repaired since recurrence is likely to follow incomplete removal. The prevalent habit of making a one half inch incision and popping the mass out like a cyst is doomed to failure, since it is really no more effective than the time honored method of beating it with the edge of a book.

Aspiration and injection of corticoids have been recommended. In my experience this has been relatively unsatisfactory. However, it may postpone definitive treatment until a more suitable time, for example, until the termination of the athlete's season of activity. Under these circumstances the joint should be carefully protected against overstrain. There is no objection to participation after adequate strapping, provided this can be made pain free. After successful surgical removal, rehabilitation should be as careful as after any joint surgery. Protective strapping should be used throughout the remainder of that season, since some weakness of the joint is inherent in this condition.

Conclusion

In this relatively brief discussion, it has not been possible to define detailed treatment for specific situations, but the general principles described will be found to apply without exception. Examination and diagnosis is of the utmost importance. The "pulled muscle" has been the graveyard of the careers of many a budding athlete. All too many times this results because of failure to recognize the initial disease and to undertake proper definitive treatment.

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The authors analyze a series of 343 patients admitted to the hospital with injury or disease of the back during the 12-year period 1945-1956. They conclude that a careful pre-employment history and physical examination, with roentgenography of the back only when the examining physician deems it advisable, would be as effective in screening potential cases of disability relative to back injury or disease as would routine roentgenography of the back.

Pre-employment Roentgenography

ONE OF THE most important causes of absenteeism in American industry is that which is attributable to disability from disease or injury of the back. The magnitude of this problem is recognized, but there are differences of opinion regarding the most desirable and practical medical approach to its control. One important method appears to be accident prevention. Included in this approach are measures for instruction in proper and safe job performance and the use of pre-employment medical examinations, including roentgenography of the back. It is to be presumed that a carefully performed medical examination which indicates the existence of a significant degree of past or present disability would result either in rejection of the applicant or his placement in a work category not associated with significant hazard relative to back injury, if he were qualified and such positions were available.

The pre-employment roentgenogram of the back has as its chief purpose the prevention of employment of applicants with pre-existing injury, disease, or congenital defect of the lumbar spine and lumbosacral region. Therefore, such examinations should be of value only in revealing the unsuspected presence of bony abnormalities of the spine in applicants who give no history or clinical evidence of back trouble.

This study represents an attempt to appraise some of the factors involved and methods of medical control, particularly the use of pre-employment roentgenography of the back, in reducing the frequency, severity, and, hence, cost of disabilities relative to back injury among employees of the Texas and New Orleans Railroad Company of the Southern Pacific Lines. Since 1951, all applicants for train, engine, and yard service have had pre-employment roentgenograms of the back and those showing any roentgenologic defect have been rejected. To analyze our experience, the records of all patients admitted to the Southern Pacific Hospital because of back problems in the period 1945-1956 were examined. There was a total of 343 cases of disability as a result of injury or disease of the back for this 12-year period, or an average of 2.3 new cases per month.

Age.—The age distribution was as follows: age 20-29, 65 cases; age 30-39, 102 cases; age 40-49, 107 cases; age 50-60, 69 cases. Thus, the majority of cases of disability occurred between the ages of 30 and 50.

Line of Duty.—The onset of back pain was associated with a specific injury in 200 cases. Among these, 135 patients, or 66 per cent, alleged injury on duty. The onset of pain was not associated with a specific injury in 143 cases.

Mechanism of Injury.—In consideration of industrial disability related to back injury or disease, one must realize that certain mechanisms of injury are not preventable by any type of pre-employment (or pre-injury) medical examination. This group includes severe falls; crush injuries; and collision accidents which result in major fractures of the spine, with or

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of the Back

without spinal cord injury, and associated multiple bodily injuries, or which at the least could be expected to produce, even in the physically perfect individual, a lesser back injury of real significance.

This type of injury is classified as major, whereas such incidents as slips, twists, minor falls, stumbling, lifting, repetitious straining, stooping, minor blows, or slack action are classified as minor. Of the total series, 200 patients associated the onset of back disability with a specific injurious incident; of these, 16 were attributed to major accidents, whereas 184 were minor. Thus, the majority of "back disability cases" among all job descriptions are the result of minor everyday incidents and account for the greatest potentially preventable cost.

Job Description.—Three job descriptions were utilized to classify patients. Heavy labor included section and extra-gang laborers, bridge and building carpenters, machinists, car repairmen, red caps, and helpers. Light labor included switchmen, conductors, brakemen, engineers, and firemen. White collar workers included secretaries, clerks, detectives, union officials, and management personnel.

In the present series, 158 cases, or 45.7 per cent were in the heavy labor group; 152 cases, or 44.3 per cent, were in the light labor group, and only 33, or 10 per cent, were in the white collar category. Obviously people who bend, twist, lift, stoop, and push are more likely to sustain back disability than others.

Roentgenographic Findings

Roentgenographic findings in the authors' patients were classified into four groups: normal, disease (arthritis or disc degeneration), congenital defects, and trauma. No attempt was made to determine the relative significance of the different varieties of congenital anomaly, inasmuch as any defect visible on roentgenogram constituted reason for rejection at time of employment. This policy has been followed because in most instances in which a back injury claim is made against the railroad, there either is evident on a roentgenogram presented to a lay jury, or such fact is testified to by the plaintiff's doctor, that a defect has caused or has contributed to the alleged back injury. Easily demonstrable defects have often been damaging medical testimony.

In the entire series of 343 cases, 150 patients (43.7 per cent) had normal roentgenograms; 126 showed evidence of disease. Only 62 patients had congenital defects, and 5 had fractures.

Most applicants for jobs with the railroad are men younger than 30 years of age. It would be logical to assume that few of them would have disease (chiefly arthritis) of the spine detectable by roentgenographic examination. In this series the distribution of roentgenographic findings correlated with age is depicted in Table 1.

Thus, 44 per cent of patients with backache on admission had normal roentgenograms. As expected, patients in the older age groups had a progressively higher incidence of roentgenographic evidence of disease, chiefly osteoarthritis. In the under 30 age group, only 9.2 per cent had changes indicative of degenerative disease of the bony spine, and hence would have been rejected for employment had they been examined. The higher incidence of disease in all other age groups probably represents disease acquired after employment; in all likelihood most of these men would have had normal pre-employment roentgenograms.

Since congenital defects are present from birth, all 62 patients, or 18 per cent of the total series, would have been rejected. Thus, theoretically, the use of

TABLE 1.—*Correlation of Age and Roentgenographic Findings in 343 Cases of Back Injury or Disease.*

Age Group	Roentgenographic Findings: Normal	Disease	Congenital Defects	Trauma	Total
20-29	45	6(9.2%)	13	1	65
30-39	62	22(21.5%)	16	2	102
40-49	34	49(45.7%)	23	1	107
50-60	9	49(71.0%)	10	1	69
Total	150	126	62	5	343
	44%	36%	18%	2%	

pre-employment roentgenograms for all applicants regardless of job description would result in a total rejection rate of 27.2 per cent. This figure parallels actual experience with applicants for train, engine, and yard service who had roentgenograms inasmuch as the average rejection rate among 1,504 applicants examined during the years 1955-1958 was 24.4 per cent. As a further cross check on this figure, 19 of the 65 patients under age 30, or 29 per cent, had either disqualifying disease or congenital defects.

One could perhaps conclude that the routine use of pre-employment roentgenograms of the back might reduce by approximately 25 per cent the incidence of disability from back injury or disease among railroad employees. This is not entirely true, however, inasmuch as such disabilities can occur in the presence of normal roentgenograms and degenerative disease progressively increases with age.

Interestingly enough, of the 343 cases of disability from back injury or disease, only 71 occurred among train, engine, or yard service employees, an incidence of 20.7 per cent, whereas 10 per cent occurred among white collar workers. This means that approximately 70 per cent of cases occurred among the heavy laborers, such as bridge and building carpenters and car cleaners. Apparently, if any group of applicants were to have pre-employment roentgenograms of the back, this category should be included.

One way of judging expense connected with disability from back injury or disease is in days of hospitalization. In this regard, the following information was derived from this study. Patients with normal roentgenograms on admission averaged 11.6 days of hospitalization; those with evidence of degenerative disease, 17.4 days; those with congenital defects, 11.3 days; those with fractures, 59.6 days; and those who had operations on the back (chiefly disc surgery or spine fusions), 67 days.

Thus, regardless of pre-employment roentgenographic findings, fractures and back surgery—namely laminectomies and spinal fusions—accounted for the longest hospitalization periods. All of these cases were attributed to disc disease or major traumas, and were considered unpreventable by any pre-employment examination. Therefore, though minor in numbers, these cases were the most expensive in terms of man hours lost, hospital expense, and probable claims paid.

Unfortunately, claim payments depend on decisions made by members of lay juries, whose judgment is determined not necessarily by fact, but largely by sentiment and fancy. It undoubtedly would be valuable to be able to show in court that a certain roentgenographic defect of the lumbar spine or sacrum existed before the alleged injury. In this regard, pre-employment roentgenograms of the back would be desirable. However, the following factors must be considered.

1. Pre-employment roentgenograms of the lumbar spine and pelvis cost about $15 per applicant; between 1955 and 1953, inclusive, with a total of 1,504 applicants, such a program would have cost $22,560.

2. Nearly one-half (44 per cent) of patients of all ages with back conditions have normal roentgenograms.

3. In the 12-year period, only 25 per cent of 343 cases of disability resulting from injury or disease of the back would have been avoidable by means of pre-employment roentgenographic examination.

4. Claim costs related to jury judgment may have little to do with factual roentgenographic findings of disease or congenital defect.

5. About an equal number of man hours lost and hospitalization time occurred among all categories of spinal findings, except those involving major injury or surgery of the back.

Conclusions

In all probability, a careful pre-employment history and physical examination, including roentgenograms of the back only when indicated in the judgment of the examining physician, would be as effective in screening potential cases of disability from back injury or disease as would roentgenography of the back. Adequate supervision and instruction in proper and safe job performance would prevent more disability of this type than any other method of control. If pre-employment roentgenography of the back is to be routinely used, all applicants for employment other than white collar workers should have such examination.

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"Draw-A-Man" Test

The Draw-A-Man test is a useful and practical guide to a child's school readiness. When used with clinical judgment, it gives a reasonably accurate estimate of a child's intellectual and emotional maturity.

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PARENTS OFTEN ASK doctors whether their child is intellectually ready for school, and sometimes it is desirable to know a child's intelligence quotient. Most doctors are neither trained nor equipped to give the time consuming standard intelligence tests, but an estimation of school readiness can be made from a preschool child's drawing of a person.

Review of Literature

Dr. Goodenough, as early as 1926, demonstrated that a reasonable intelligence approximation could be obtained by the adequacy with which a child could draw a person.

In 1950, the authors began administering this test experimentally to find out whether its use could assist in determining the school readiness of a child approaching, or over, the age of six. The study was made possible by a grant from the Hogg Foundation for Mental Health, University of Texas.

At the time of the preschool physical examination, the child was given a piece of paper and was asked to draw a man. He was left alone in the examining room, and was allowed as much time as he needed to complete the picture. The results were scored by scanning a modified version (Table 1) of Goodenough's original scale (Table 2), which considers completeness of anatomic details as the basis for

*Deceased June 2, 1960.

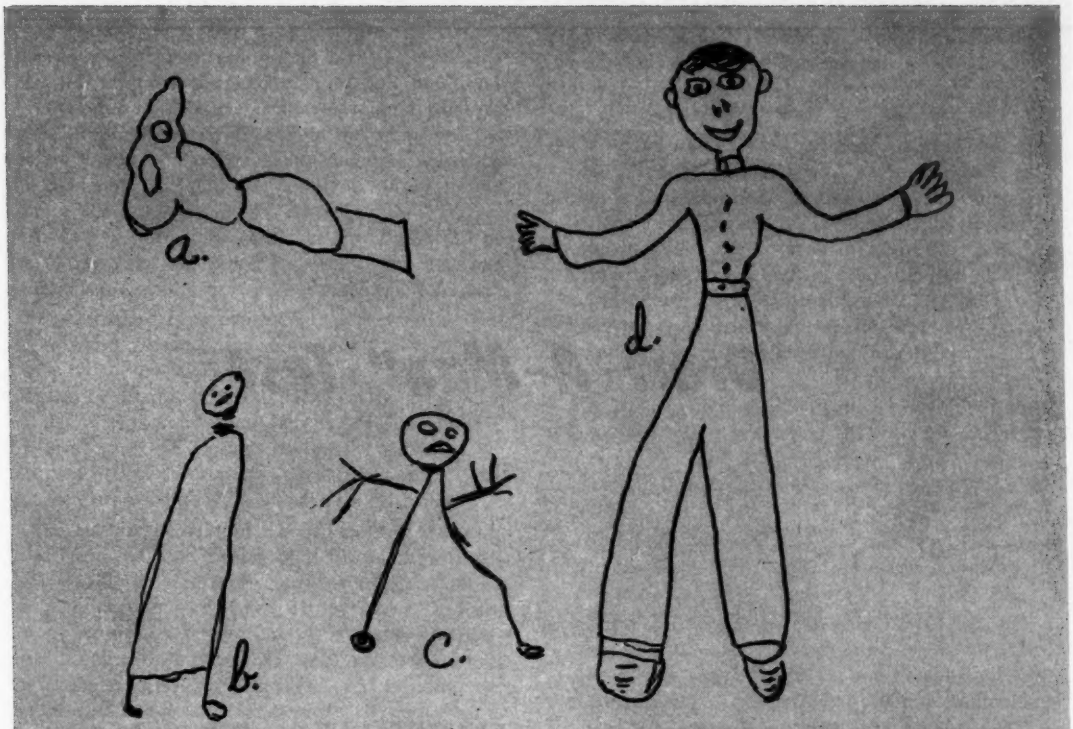

Fig. 1. These are sample drawings obtained by the authors. Number of points scored, chronologic age, mental age, and intelligence quotient are given, along with the authors' notations.

a. 5 points. CA, 7-8. MA, 4-3. IQ, 55. The child was adopted at age 2 against medical advice. He sat at 12 months, used words at 18 months, walked at 22 months, and was bowel and bladder trained at 58 months. School activities at the end of the first year were negligible, and the second year was spent in a class for the retarded.

b. 6 points. CA, 6-0. MA, 4-6. IQ, 76. This picture was inadequate for IQ prediction, and the child was judged not ready for school. The teacher's evaluation was "poor student" and the Wechsler Intelligence Scale for Children (WISC) results were in the same level as the Draw-A-Man score.

c. 11 points. CA, 6-3. MA, 5-9. IQ, 92. It was predicted that the child would be in the lower third of the class, and the teacher's evaluation verified this. The WISC results were on the same level as the drawing.

d. 40 points. CA, 6-5. MA, 13-0. IQ, 200. This child was predicted to be at the very top in class ratings, and this was verified by the teacher's evaluation on the basis of scholarship, self confidence, leadership, and maturity. The WISC score was lower than the drawing score, but still was extremely high.

evaluation. Using the original Goodenough key, 51 points are possible. The modified scale simplifies scoring when the drawings are within the normal mental age range of a six year old. Artistic capability plays no part in the scoring (Fig. 1). The points are totaled and converted into a mental age (Table 3) which is related to the chronologic age by this formula:

$$\frac{MA}{CA} \times 100 = I.Q.$$

Coleman's report on this study in 1959[2] resulted in a flood of inquiries from every continent, signifying that many pediatricians were concerned with the problem.

The results of this procedure indicated that the Draw-A-Man test administered by the physician at the time of the pre-first grade examination correlated significantly with intelligence and achievement tests given later in school. In other words, the pediatrician without special training in psychological techniques could administer and score the test and, with his own

TABLE 1.—*Criteria for Scoring.*

Bakwin and associates[3] use this modified criteria for scoring the Draw-A-Man test.

1. Head present.
2. Legs present.
3. Arms present.
4. Trunk present.
5. Length of trunk greater than breadth.
6. Shoulder indicated.
7. Both arms and legs attached to trunk.
8. Legs attached to trunk and arms to trunk at correct point.
9. Neck present.
10. Outline of neck continuous with that of head or trunk or both.
11. Eyes present.
12. Nose present.
13. Mouth present.
14. Both nose and mouth in two dimensions; two lips shown.
15. Nostrils indicated.
16. Hair shown.
17. Hair on more than circumference of head, nontransparent, better than scribble.
18. Clothing present.
19. Two articles of clothing, nontransparent.
20. Entire drawing, with sleeves and trousers shown, free from transparency.
21. Four or more articles of clothing definitely indicated.
22. Costume complete without incongruities.
23. Fingers shown.
24. Correct number of fingers shown.
25. Fingers in two dimensions, length greater than breadth, angle subtended not greater than 180 degrees.
26. Opposition of thumbs shown.
27. Hand shown as distinct from fingers or arms.
28. Arm joint shown. Either elbow, shoulder or both.

evaluation of the child's maturity and physical well being, could place reasonable confidence in this simple procedure as a predictor of school readiness and emotional status. The pediatrician could use this information in advising the parent about school readiness.

The Present Study

The present study was undertaken to determine whether the Goodenough test, as administered and scored in the pediatrician's office, has a high degree

TABLE 2.—*Goodenough Draw-A-Man Test Key.*

1. Head present.
2. Legs present.
3. Arms present.

4a. Trunk present.
4b. Trunk proportion: length, breadth.
4c. Shoulders present.

5a. Attachment of limbs. (A)
5b. Attachment of limbs. (B)

6a. Neck present.
6b. Neck outline (continuous with either head or trunk).

7a. Eyes present.
7b. Nose present.
7c. Mouth present.
7d. Features in two dimensions (nose definitely drawn better than dot or line and two lips shown).
7e. Nostrils shown.

8a. Hair present.
8b. Hair detail: better than scribble on top, must shown tendency to follow head form.

9a. Clothing present: any including row of buttons.
9b. Two articles nontransparent.
9c. Entirely nontransparent.
9d. Four articles shown.
9e. Complete costume, free from incongruities.

10a. Fingers present.
10b. Number correct.
10c. Detail correct.
10d. Thumb shown.
10e. Hand shown.

11a. Arm joints.
11b. Leg joints.

12a. Proportion. Head: not more than ½ the trunk or less than 1/10 trunk.
12b. Proportion. Arms: length > trunk, but not reach knee.
12c. Proportion. Legs: length < twice trunk length; > trunk length.
12d. Proportion. Feet: 2 dimensions, length > height, length feet > 1/10 length leg, < 1/3.
12e. Two dimensions, legs, arms.

13. Heel.

14a. Coordination, A lines.
14b. Coordination, B lines.
14c. Coordination, head.
14d. Coordination, trunk.
14e. Coordination, arms and legs.
14f. Coordination, features.

15a. Ear present.
15b. Ear detail.

16a. Eye detail, brow or lash.
16b. Eye detail, pupil.
16c. Eye detail, shape.
16d. Eye detail, glance.

17a. Chin and forehead shown.
17b. Chin and forehead; detail.

18a. Profile A.
18b. Profile B.

TABLE 3.—*Table of Test Age Equivalents of Scores.*

Score	Mental yrs.	Age mos.	Score	Mental yrs.	Age mos.
1	3	3	26	9	6
2	3	6	27	9	9
3	3	9	28	10	0
4	4	0	29	10	3
5	4	3	30	10	6
6	4	6	31	10	9
7	4	9	32	11	0
8	5	0	33	11	3
9	5	3	34	11	6
10	5	6	35	11	9
11	5	9	36	12	0
12	6	0	37	12	3
13	6	3	38	12	6
14	6	6	39	12	9
15	6	9	40	13	0
16	7	0	41	Above 13	
17	7	3	42	"	
18	7	6	43	"	
19	7	9	44	"	
20	8	0	45	"	
21	8	3	46	"	
22	8	6	47	"	
23	8	9	48	"	
24	9	0	49	"	
25	9	3	50	"	
			51	"	

of reliability, as well as possible significance, in predicting the progress and achievement of the child in school.

Children were given the Draw-A-Man test at the same time that they were given other tests which already are accepted as being scientifically indicative of a child's school readiness. Results of all the tests were compared and significant correlations were noted.

In this study (also done under a grant from the Hogg Foundation for Mental Health) all members of the medical portion of the Children's Medical Center in Austin obtained drawings and evaluated them. As an additional aid to total estimation of school readiness, the physician made a separate report based on his personal knowledge of the child (Table 4). This report noted medical history, growth and development, and physical problems; possible emotional problems; and a socioeconomic evaluation of the family situation. In grading each of these units, one was the highest and five the lowest. Using the same scale, the physician evaluated the emotional maturity level from the drawings.

The psychologist associated with the study selected four subtests of the Wechsler Intelligence Scale for Children to constitute the brief testing. Two tests were primarily verbal and two were primarily performance tests. This samples general environmental awareness, logical deductive powers, immediate learning ability, and analytic ability.

Two graduate psychology students, under the supervision of the clinical psychologist, gave all of these tests in a room set aside at the Center. It required about 25 minutes to administer and 10 minutes to score them. The sum of both the physicians' and the psychologists' data was coded on IBM cards. Correlations on any two facets of the study thus could be extracted, as well as a host of other information.

In the spring of 1960, additional data (13 items) were obtained from teachers who instructed these children in the first grade. They filled out a weighted questionnaire dealing with academic and personality factors, school adjustment, and achievement. The number of six year olds at the onset of the study was 380, and questionnaires were completed on 240. This latter information also was converted to an IBM deck.

It is impossible to present all the results of the entire study, as some factors still are being analyzed. Further observations on this group of children are anticipated. What is presented pertains primarily to the predictive value of the Goodenough test and its efficiency as compared with standardized intelligence tests, and the relationship of emotional and environmental factors as they affect production as measured by the tests.

Correlation of significant levels used in behavior and natural science research was analyzed. The Goodenough test results showed highly significant correlation with the brief form of the Wechsler Intelligence Scale. In each of its subtests the Draw-A-Man test had the same high relationship to the teacher evaluation as did the brief Wechsler tests. It also correlated significantly with the Metropolitan Reading Readiness Test and the California Mental Maturity Scale.

Emotional maturity as rated by the physician correlated significantly with leadership ability as judged by the teacher. The socioeconomic level has been mentioned as influencing intelligence and school achievement; this was verified both by the Goodenough and Wechsler tests. Another interesting socioeconomic relationship was that the higher the level, the more the child was absent from school. This might be explained that in this strata, parents pay more attention to early symptoms of diseases, or that they may give in to the whims of their children more frequently.

Dr. Ralph Hanna, an Austin pediatrician, presented this paper as the James M. Coleman Memorial Address before the Texas Medical Association's Section on Pediatrics April 24 in Galveston.

TABLE 4.—*Report by Physician.*

SPECIFIC PHYSICAL PROBLEMS

A. Sensory
   1. Eye defects
   2. Hearing loss
   3. Other

B. Motor
   1. Coordination
   2. Muscular weakness
   3. Hyperactivity
   4. Spasticity
   5. Other

C. Allergic problems
   1. Eczema
   2. Vaso-motor rhinitis
   3. Asthma
   4. Other

D. Cardiovascular conditions

E. Endocrine problems

F. Broncho-pulmonary

G. Orthopedic

H. Other

SPECIFIC BEHAVIOR PROBLEMS

1. Colic
2. Sleep disturbance
3. Feeding problem
4. Toilet training
5. Obedience
6. Pica
7. Masturbation
8. Destructiveness
9. Dependency
10. Bed wetting
11. Difficulties with siblings
12. Difficulties with playmates
13. Accident prone
14. Running off
15. Lying
16. Stealing
17. Other

HISTORICAL SUMMARY

1. Age when first seen
2. Complications of birth
3. Convulsions
4. Critical or prolonged illness
5. Serious accidents

GROWTH AND DEVELOPMENT

1. Birth weight
2. Weight at school examination
3. Height at school examination
4. Basic family stature
5. General pattern of growth
6. Age of sitting
7. Age of walking
8. Age of talking

ESTIMATE OF FAMILY SITUATION

1. Father employed
2. Mother employed
3. Grandparents in home
4. Maid charged with care
5. Disturbed home
6. Divorce
7. Adoption
8. A parent dead
9. Institutionalized parent
10. Retarded or defective sibling
11. Usual care in day nursery
12. Nursery school
13. Kindergarten
14. Discipline or control
15. Number of siblings
16. Numerical order among living siblings
17. Recipient service by social agency

A lack of dependency, as judged by the physician, correlated significantly with the teacher evaluation of leadership ability and emotional stability, but there is a negative correlation between absence from school and dependency as judged by the physician. The more dependent the child, the higher is his rate of school absence. Enuresis and other emotional problems bear no relationship to any of the other variables examined thus far.

In general, it may be said that Coleman's belief concerning the value of this simple tool as a predictor of school readiness has been scientifically corroborated.

Conclusion

This research has shown that the Draw-A-Man test is a valuable aid to the office practice of pediatrics in determining the emotional and intellectual level of functions of those about to enter elementary school. The correlations, though significant, are too low for individual predictions; nonetheless, with clinical judgment it is an excellent tool to use as a predictor of school readiness.

The eager practitioner is cautioned against making predictions without studying all available data on test interpretation. His evaluation should be based on maturity as determined by medical judgment as well as the productivity of the child's drawing.

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Visceral Mucormycosis

The authors report 3 cases of a condition uncommon in man. In one, lesions were found in the lungs, liver, and spleen. The patient had uncontrolled diabetes, acidotic coma, and abscess formation.

THE PRODUCTION of spontaneous infections by Phycomycetes of the family Mucoraceae is not infrequent in animals such as birds, pigs, dogs, horses and cows, but such infections are uncommon in man.[11, 15] The genera *Mucor* and *Rhizopus,* which are abundant in nature as saprophytes in the air, soil, and manure, are frequently found on fruits and starchy foods such as bread. In some instances they have been cultured from the nasal mucosa and intestinal tracts of normal individuals.[18] However, these organisms have been found in diseased organs, where they appear as thick, branching, non-septate hyphae. The demonstration of such hyphae in tissue is used to make the diagnosis of mucormycosis. For the most part, the hyphae tend to be coenocytic and in cultures septa are formed in senescence or when reproductive structures are developed. At that time, the septa cut off the older vacuolated sections of growth from the younger portions that are in the process of reproduction.[7]

Although cases without any recognized predisposing factors have been reported, most cases in man have occurred during the course of a debilitating disease such as diabetes in the decompensated state, leukemia in the acute phase, malignant disease of any location, severe burns, and liver cirrhosis. In addition, the immoderate use of antibiotics to suppress the growth of bacteria has been incriminated as a predisposing factor. Baker[18] has expressed the opinion that the use of corticosteroids favored the dissemination of organisms in animal experiments, possibly as a result of the diabetogenic effect.

Few cases were reported before 1900, but in the last ten years there has been a noticeable increase in the recognition of this disease. In 1959, Hutter[12] reviewed a total of 110 cases of mucormycosis from the literature and presented 4 additional cases in patients with malignancies. The majority of these cases were diagnosed from autopsy findings. The most frequent locations for lesions were the lungs[1, 2, 3, 5, 8] and skin.[13, 20, 21] General dissemination or localization in the central nervous system[10, 11, 15, 18, 20] and gastrointestinal tract[6] was less common. A few cases have been diagnosed in living patients and survival from the disease has been reported. The infections of man seem to show no relationship to sex, race, age, or social position but are more dependent on the predisposing factors.

In the present report, three cases of mucormycosis are presented, along with a discussion of the possible predisposing factors of importance for this disease with visceral involvement, abscess and granuloma formation.

Case Reports

CASE 1.—A 31 year old white male was admitted because of acidotic coma. He was known to have had diabetes mellitus for two years. The blood sugar level on admission was 1,024 mg. per 100 cc., urea nitrogen 366 mg. per 100 cc., carbon dioxide combining power 6 mEq./L. and potassium 2.7 mEq./L. During hospitalization the patient improved at first, but a few days later he had chest pain, hemoptysis, anuria, and tenderness of both legs. He became progressively lethargic.

From Baylor University Medical Center, Dallas 10, Texas.

Report of 3 Cases

(Phycomycosis)

Bilateral superficial femoral vein ligation was performed, and no thrombi were palpated at the time of operation. However, the patient was treated from that time on with heparin until he died 30 days after admission.

The body weighed 58 kg. (128 lb.). The left pleural cavity contained approximately 800 cc. of purulent blood stained material; the pericardial cavity contained approximately 600 cc. of yellow fluid. The left lung weighed 750 Gm. and the right 700 Gm. Multiple sections of the left lower lobe revealed large areas of necrosis with abscess formation, and a blood vessel was occluded by a reddish-black thrombus at the hilum. The spleen was enlarged and soft, and weighed 310 Gm. A large area of old infarction was identified, with multiple superimposed focal areas of necrosis and abscess formation. The liver was enlarged and firm, and weighed 2,700 Gm. Several small abscesses were found; the largest measured 3 cm. in diameter. Microscopic examination of the lungs showed large areas of necrosis. The fungus stains of these areas revealed numerous branching, non-septate, large and thick hyphae similar to that of the family Mucoracea of the order Phycomycetes (Fig. 1 and 2). Numerous round inflammatory cells and multinucleated giant cells surrounded the areas of necrosis. One section showed a non-organized thrombus with hyphae and granulation tissue penetrated by mycelial threads within the adjacent arterial wall (Fig. 6). Sections from the liver and spleen showed hyphae similar to those in the lungs with large areas of necrosis of the parenchyma and granuloma formation (Fig. 3, 4, and 5). There were numerous multinucleated giant cells in which some hyphae were seen. The blood culture taken at autopsy grew *Streptococcus hemolyticus* and *Pseudomonas aeruginosa.* Fungus cultures from the lungs, liver, and spleen showed no growth after seven days.

Final diagnoses were diabetes mellitus; mucormycosis of lungs, liver, and spleen with multiple abscess formation; empyema as a result of mucormycosis; septicemia attributable to *Streptococcus hemolyticus* and *Pseudomonas aeruginosa;* hemorrhagic bilateral bronchopneumonia; bilateral pulmonary congestion and edema; and lower nephron nephrosis.

CASE 2.—The patient, a 65 year old white female, was known to have acute myelogenous leukemia. She was hospitalized because of fever and persistent cough. On admission her temperature was 100 F. During hospitalization she received multiple broad spectrum antibiotics, corticotrophin, and 6-mercaptopurine. The day before death the white blood cell count was 56,000 with 52 per cent blast forms in the circulating blood. The patient died ten days after admission.

The body weighed 48 kg. The left lung weighed 550 Gm., the right 660 Gm. In the upper lobes there were numerous wedge shaped, dark red areas of infarction. The main pulmonary artery contained a premortem thrombus that occluded the main branch to the right upper lobe. The liver weighed 1,800 Gm., the spleen 270 Gm., and the kidneys 180 Gm. each.

Microscopically, the lungs showed areas of acute necrosis and diffuse hemorrhages, and a few blood vessels contained thrombi. In the areas of necrosis, there was a profuse growth of fungi in the blood vessel walls and lumina. These hyphae were large, thick, and non-septate. No fungi were found in the other organs.

The final diagnoses were acute myelocytic leukemia; mucormycosis of the lungs; and thrombosis of the main branch of the pulmonary artery to the right upper lobe, with multiple hemorrhagic infarcts of the upper lobes and hemorrhagic diathesis.

CASE 3.—An 8 year old white male was known to have had acute lymphatic leukemia for one and a half years. During hospitalization, despite administration of

Fig. 1. Mucor organism; note thick, branching, non-septate hyphae. G.M.S. (Gormori's methenamine silver nitrate technique). X 875.

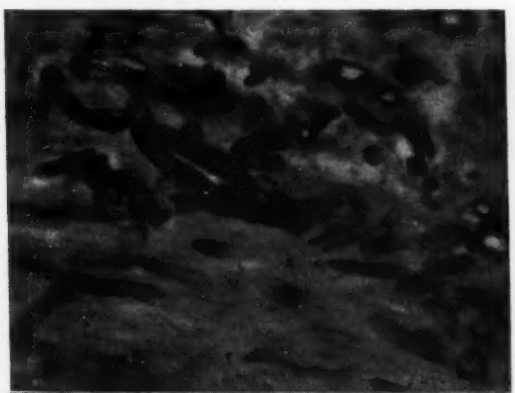

Fig. 2. Mucor organism branching on cross section. G.M.S., X 875.

6-mercaptopurine, Aminopterin, and steroids, his condition rapidly deteriorated and a high spiking fever developed with generalized petechiae and ecchymoses. At autopsy, the body weighed 33 kg. Bilateral lung weight was 620 Gm. In the right upper lobe there was a firm, reddish-brown area of infarction. A thrombosed vessel leading to the infarcted area could be seen in cross section. The entire right colon had a hard cobblestone appearance, and the wall was approximately 1 cm. thick. There appeared to be either dense fibrosis or infiltration with gray tumor tissue in the submucosa of the colon. The liver weighed 2,780 Gm. and the spleen 1,320 Gm.

Microscopically, one section of the lung showed diffuse necrosis of pulmonary tissue. Vascular channels contained the large, branching, thick, non-septate hyphae. One section of colon showed a fibrinous exudate that averaged 5 cm. in thickness and replaced the mucosa and submucosa. It was infiltrated by hyphae similar to those found in the lungs, and rod shaped bacteria were present.

The final diagnoses included acute lymphatic leukemia with leukemic infiltration of bone marrow, kidneys, liver, and lymph nodes. In addition the following were present: thrombocytopenia with petechia, ecchymosis, and hemorrhages into the liver, epicardium, kidneys, gastrointestinal tract, and subdural and subarachnoid spaces; tracheobronchitis and bronchopneumonia; fungal and bacterial infection of the colon and lungs consistent with mucormycosis; and pulmonary infarction.

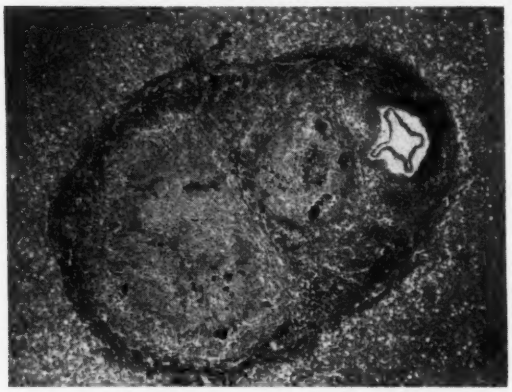

Fig. 3. Liver, mucor granuloma with central areas of necrosis. Hematoxylin-eosin, (H. & E.), X 32.

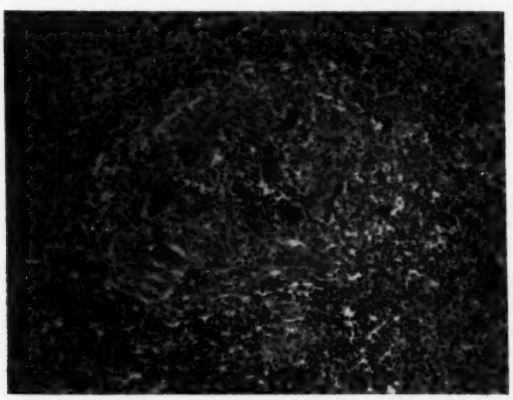

Fig. 4. Localized mucor granuloma in liver. Note giant cells. Granuloma contains polymorphonuclear leukocytes in necrotic center. H. & E., X 90.

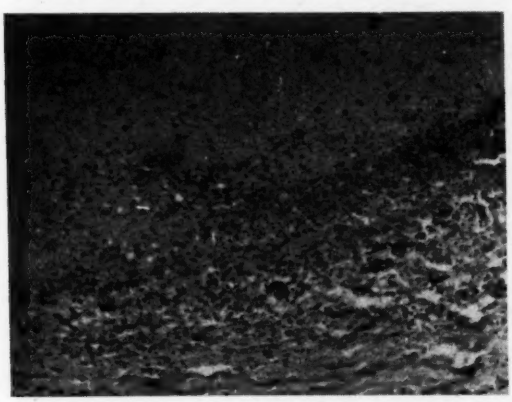

Fig. 5. Splenic granuloma with giant cells and polymorphonuclear leukocytes. H. & E., X 90.

Discussion

The three present cases of mucormycosis were diagnosed by finding large, branching, thick, non-septate hyphae in the tissues when they were stained with hematoxylin and eosin and Gomori's methenamine silver nitrate technique. Although these cases add little to the frequency, pathogenesis, and clinical picture, previously reviewed in the literature, Case 1 shows an unusual instance of mucormycosis with granulation tissue, abscess formation, presence of giant cells, and intravascular penetration by the fungi. Cases 2 and 3 are two more instances of the disease in leukemic patients treated with cytotoxic compounds, radioactive drugs, steroids, and large doses of antibiotics. When 226 autopsies were reviewed for patients who died of leukemia, diabetes, cirrhosis, and malignancies at Baylor University Medical Center from 1957 to 1958, only two instances (Cases 2 and 3), of mucormycosis were found. As can be noted in the final diagnoses of these cases,

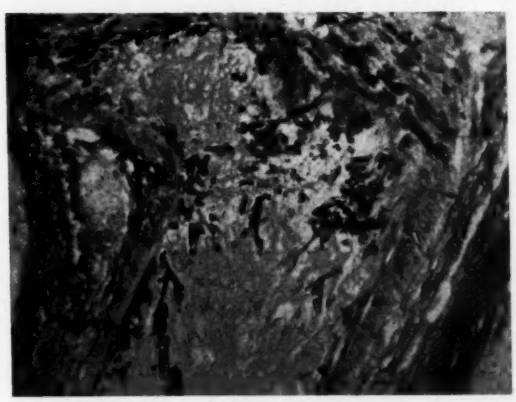

Fig. 6. Pulmonary blood vessel with numerous mucor organisms in fresh thrombus. G.M.S., X 400.

the fungus infection was an accessory finding rather than the primary disease process.

The findings in Case 1 are different; in this instance, the cause of death was attributed to mucormycosis. The onset, clinical picture, evolution, and autopsy findings in this case followed closely those previously described. In the gross examination, the multiple areas of necrosis with abscess formation in the lungs, liver, and spleen were striking findings.

In the authors' review of the literature, only two cases involved the lungs, liver, and spleen in the same patient. Baker[1] reported necrosis attributed to fungi in a three year old Negro child with third degree burns involving 75 per cent of the body surface. Gatling[9] reported a second case in which an apparently healthy newborn infant died at 16 days of age. Therefore, Case 1 is apparently a third case of mucormycosis involving lungs, liver, and spleen, but it is the first reported in an adult with uncontrolled diabetes and acidotic coma. In addition, abscess formation, which is infrequently reported in other cases, was a prominent feature. Other differences from the previously reported cases have been noted in the microscopic examination. Large thrombi and extensive areas of necrosis, both infiltrated by hyphae with peculiar vascular affinity, have been reported in most American, European, and Canadian cases of mucormycosis. Only rarely have foreign body giant cells been observed.[1] In an Indonesian case reported by Lie-Kian-Joe,[15] the fungi had no marked affinity for the blood vessels, and granulation tissue and foreign body giant cells were identified.

Case 1 of this report is unique in that this patient illustrates the vascular affinity of the hyphae and large areas of necrosis (Fig. 3, 5, and 6) seen in the American, European, and Canadian cases, as well as the granulomatous reaction and multinucleated giant cells (Fig. 3, 4, and 5), seen in the Indonesian case. The difference between this patient and those previously reported is the coexistence of all of the prior histologically different features, with the exception of the yellow needle-like material and typical large thrombi formation.

Conclusion

A case of mucormycosis in a dibetic patient involving the lungs, liver, and spleen is reported. It is apparently the first in an adult, and the third of these locations in all ages which has involved all of the organs previously listed. Two more cases in patients of different ages with leukemia are added.

The diagnosis was made by identification of the large, branching, thick, non-septate hyphae in the tissue. In Case 1, the fungus infection was diagnosed as the primary cause of death, but in the others it was an accessory finding at autopsy.

Review of the literature with the findings in the authors' cases indicate that mucormycosis as a fungus infection may occur at any age in several locations. This disease has a definite pathogenesis and varying clinical picture. The histologic features are those of a necrotizing process. However, a granuloma with giant cells and acute inflammatory cells may occur. The acute vascular changes with thrombi formation have been identified as one of the most prominent features.

The authors wish to acknowledge the assistance of K. G. Ishak, M.D., and W. L. Bendel, Jr., M.D., in this project.

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♦ Drs. Cuadrado and Race and Mr. Haberman, Baylor University Medical Center, Dallas 10.

They're Never Too Busy to Laugh

THE "OLE NASTY LETTERS" that remind doctors to complete their hospital records are taken seriously and with personal offense by some doctors, while others toss them into the wastebasket with no pangs of conscience. Because of those "ole nasty letters", many a medical record librarian find herself slotted as "the battle axe of the hospital".

But in Methodist Hospital of Dallas, Maifair Offutt, RRL, handles her "dunning" in a different way. It proved so effective that she wrote an article on it which was published in the August issue of *Texas Hospitals*.

Miss Offutt reasoned that if nice, business-like, impersonal, or dripping sweet letters wouldn't work, cartoons might.

She writes: "Human beings do not like to be told anything by anybody; men do not like to be told anything by women, and to come closer to home, doctors do not like to be told anything by medical record librarians. So, long ago, we switched to having these letters signed by the chairman of the medical record committee. Since he had signed those 'ole nasty letters,' we thought it proper and fitting for him to sign the cartoon letters.

"On the bottom of the cartoons we put a personal note to the doctor telling him how many records are due by a certain date, and we try to make the personal note in keeping with the caption underneath the cartoon. For instance, underneath the cartoon . . . telling the doctor he is the only doctor whose delinquent records predate ether anesthetic, we wrote: 'Dear Dr. Jones: You are not this far behind but you do have 17 charts to be completed by June 1.'

"The response to these cartoons has been great, and not once has any doctor referred to that 'ole nasty letter.' We have had more records completed quicker by more doctors than previously. Some of the doctors who do not get letters because they keep their records current have come in and asked if they could have one of the letters. Of course, we are glad to comply with this request.

"One doctor, who is too often on the delinquent list, said he rushed right over to do his records because he liked the letter he received. Others say they look forward to the next letter to see what the cartoon will be. One doctor, working on his records when he noticed the typist sending out the new letter, put some incomplete records back in his file so he would get one of the letters. Most doctors like the cartoon letters and refer to them as something new to read, clever, interesting and eye-catching.

"We all know that doctors are extremely busy men with no time to call their own, and it is understandable how they are so easily irked by even a gentle reminder of anything so unpleasant and time-consuming as medical records. They may be too busy to work on records but they are never too busy to laugh. The seemingly grouchiest doctors have a sense of humor, and you can always appeal to that sense of humor—even in getting records completed."

" . . . you are the only doctor whose delinquent records pre-date ether anesthetic."

Medical Quackery Is Conference Topic

Spotlighting medical quacks and charlatans who thrive on public ignorance, the First National Congress on Medical Quackery will be held October 6 and 7 in Washington, D. C., under the sponsorship of the American Medical Association and the Food and Drug Administration.

Taking part in the program will be officials from federal agencies and the AMA; representatives of national voluntary organizations involved in, or interested in, the health field; and members of law enforcement agencies.

In 1936, the AMA's Department of Investigation exposed the infamous John R. Brinkley, who, among other things, claimed to rejuvenate old men with goat glands. In 1953, Jacob Sass Schirmer was forced to retire; he had called himself a physician and had promoted a quack treatment of cancer and leukemia by inhaling bacteriophage. More recently, the Hoxey Clinics for the "treatment" of cancer have been closed by federal authorities with the aid of the AMA investigations.

In June, the AMA House of Delegates urged state and county medical societies to send representatives to the National Congress, which will be a springboard for the attack on medical quackery.

Occupational Health Congress

The American Medical Association will hold its 21st national Congress on Occupational Health in Denver October 2-4.

Although the congress is directed primarily toward the medical profession, many of the sessions are of interest to nurses, industrial hygienists, management representatives, and others concerned with occupational health problems.

"Problems of Survival in Space" will be the subject of the annual banquet address to be given by Dr. James G. Gaume, chief of the Space Biotechnology Program at the Martin Company in Denver. Other subjects to be discussed include diagnosis of occupational illness by the general practitioner, relationship between the plant physician and the family doctor, workmen's compensation, the role of the occupational nurse, and the efficient utilization of the worker.

District 8 Officers Elected

Officers named July 7, by the Eighth District Medical Society include Dr. Andrew Magliolo, Dickinson, president; Dr. H. K. May, Lake Jackson, vice president; and Dr. Harry K. Davis, Galveston, secretary.

Officers were named at a joint meeting of Fifth, Sixth, and Eighth Districts in Corpus Christi.

U. S. Civil Defense Council Sets Conference

In Los Angeles from October 16 to 20, the United State Civil Defense Council will hold its tenth annual conference.

With headquarters at the Ambassador Hotel, the Council will study the theme "Role of Civil Defense in National Strategy". Featured topics will include "Nature of War and Deterrence", "Long Range Effects of Radiation", "Red Cross—CD Partnership in National Disaster", "Importance of OPAL and Local Disaster Exercises", "New Civil Defense Programs", and "Subversive Influences", plus a Nike demonstration.

In connection with the conference, a three day course on "Decision Making in Emergencies" will be held twice: October 12-14 and October 23-25. Persons attending the course are eligible for partial reimbursement for traveling and for per diem expense under the Office of Civil Defense Mobilization (OCDM) student training program.

Also scheduled after the conference is an eight day tour of Hawaii.

Further information may be obtained from Joseph J. Micciche, Conference Chairman, 6501 Fountain Ave., Hollywood 28, Calif.

Public Health Group Plans November Meet

The American Public Health Association will hold its annual meeting November 13-17 in Detroit.

Among those attending will be administrators, research scientists, and other specialists on the staffs of international, national, state and local health services, and voluntary agencies. More than 5,000 are expected to attend.

All phases of public health will be probed during lectures and discussions that will comprise the program. Fourteen other health organizations will hold meetings concurrently. Scientific sessions and exhibits will cover community health, prevention of disease, and control of environmental health factors. Progress reports will be given in section meetings on dental health, engineering and sanitation, epidemiology, food and nutrition, health officers, laboratory, maternal and child health, medical care, mental health, occupational health, public health education, public health nursing, school health, and statistics.

Details of the program can be obtained by writing the Association, 1790 Broadway, New York, N. Y.

"Educational Afternoon" Offered In Temple Clinic

The Temple division of the University of Texas Postgraduate School of Medicine will present an educational program on the afternoon of September 9 at Scott and White Clinic in Temple.

Dr. S. Gilbert Blount, Jr., University of Colorado Medical Center, Denver, will discuss "The Natural History of Atrial Septal Defects" and "The Current Surgical Therapy and Results of This Therapy in the Patient with Tetralogy of Fallot."

The second speaker, Dr. James T. Priestley of the Mayo Clinic, Rochester, Minn., will have as his subjects "Hyperinsulinism" and "Surgical Lesions of the Adrenal Glands".

In the evening there will be a Dutch treat outdoor barbecue, and the Hon. Robert W. Calvert, Chief Justice of the Texas Supreme Court will be the guest speaker.

The scientific program is approved for three hours of Category 1 credit by the American Academy of General Practice. There will be no registration fee. Dr. R. D. Haines, Chairman of the Education and Research Division of Scott and White Clinic, can supply additional information.

12,000 Expected to Attend AMA Meet in Atlantic City

September 25-28 are the dates for the meeting of the 63rd American Hospital Association, expected to draw about 12,000 persons to Atlantic City.

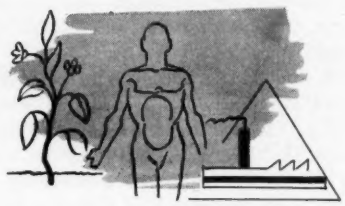
With the theme "Hospitals in a Changing America," the meeting will include program sessions ranging from general assemblies covering major national issues to instructional conferences dealing with specific phases of hospital operation.

Among general assembly speakers will be Dr. Luther L. Terry, surgeon general of the U. S. Public Health Service, Washington, D. C.; Dr. George E. Godber, chief medical officer, British Ministry of Health, London, and Dr. Leonard W. Larson, Bismarck, N. D., president of the American Medical Association.

To be installed as president of the AHA during the meeting will be Dr. Jack Masur, director of the Clinical Center, National Institutes of Health, Bethesda, Md. He will succeed Frank S. Groner, administrator of Baptist Memorial Hospital, Memphis.

International MD's to Probe New Areas of Allergology

Prominent physicians and scientists from all parts of the world have been invited to take part in the conferences, symposia, and panel discussions of the Fourth International Congress of Allergology, which will be held October 15-20 in New York.



Among the subjects to be presented are genetics in allergy, acquired tolerance, transplantation immunity, drug hypersensitivity, contact allergy, general mechanisms in allergy, mechanisms of antibody fixation, delayed hypersensitivity, auto immune processes, steroid therapy, and new methods in treatment of allergy.

At the main meetings, all papers will be translated simultaneously into English, French, German, and Spanish. Registration fee for regular members will be $45; wives of members may register for $20.

Complete details may be obtained from Dr. William B. Sherman, 60 East 58th Street, New York 22.

Western Institute on Epilepsy

Clinical, biochemical, neurophysiologic, psychological, social, and electro-encephalographic aspects of epilepsy will be the topics for the program of the forthcoming Western Institute on Epilepsy at the Granada Hotel, San Antonio, in October.

In addition, there will be a panel discussion on the post-traumatic, legal, and community problems created by epilepsy. Formal program announcements will be mailed in September.

The conference will be held October 11-14, and details can be obtained from Dr. Lewis M. Helfer, Chairman, Program Committee, 208 Professional Building, 101 North McCullough, San Antonio 12.

Dietetic Group To Meet

The American Dietetic Association will hold its 44th annual meeting October 24 through 27 in St. Louis.

Dr. Leroy Burney, former surgeon general of the United States Public Health Service will be one of the speakers.

Among topics to be discussed will be diet therapy, nutrition, dental health, and food service administration. An extensive exhibition of food service equipment and food products will be on display.

Information on the conference can be obtained by writing the American Dietetic Association, 620 North Michigan Avenue, Chicago 1, Ill.

Psychiatric Abstracts Now Being Accepted

Scientific papers are now being accepted for consideration by the program committee for the 1961 Midwest Divisional Meeting of the American Psychiatric Association November 16-18 in Milwaukee. The committee is also interested in those wanting to participate in the program as panelists.

Abstracts of papers (400 words) should be submitted no later than June 1 to Dr. B. Cullen Burris, program chairman, Milwaukee Divisional Meeting Executive Office, 756 North Milwaukee Street, Milwaukee, Wis.

Fracture Association Lectures Approved for AAGP Credit

Members of the American Fracture Association will gather in Washington, D. C., September 16-23 for six days of scientific presentations. The majority of the lectures are acceptable for credit in category 2 by the American Academy of General Practice, and a postgraduate course has been arranged which is acceptable for category 1 credit. It encompasses orthopedic surgery and fractures and will be held at Georgetown University School of Medicine.

Dr. W. Compere Basom, El Paso, will preside over the September 20 program. The Shoreham Hotel will be headquarters for the meeting, and reservations may be made direct. Additional information may be obtained from Dr. Milton C. Cobey, 1726 1st Street, N.W., Washington 6, D. C.

Physician-Congressman To Be PR Conference Guest

Dr. Durward G. Hall, a physician and a representative in Congress from the Fifth Congressional District of Missouri, will be a guest speaker at the Seventh Annual Public Relations Conference scheduled September 30 by Texas Medical Association.

Dr. Hall, a resident of Springfield, Mo., will talk at the Austin meeting during the morning session.

Other speakers scheduled during the morning conference are Charles E. Irvin, Ed.D., of Ormond Beach, Fla., representative of General Motors Corp., and Leo E. Brown of Chicago, director of the Communications Division of the American Medical Association.

An afternoon speaker is Robert W. French, Ph.D., president of the Tax Foundation, Inc., New York, who will discuss taxes and governmental spending.

Two panel discussions are on the day's program. The first one, set for the morning, is "Priority Public Relations Projects for the Year Ahead". Dr. Foy H. Moody of Corpus Christi, will moderate. The second session, an afternoon one, will be "County Society Public Relations Panorama" over which Dr. Joe R. Donaldson of Pampa will moderate. County society representatives will be featured.

Dr. May Owen, immediate Past President of Texas Medical Association, will be on hand to present the first Harriet Cunningham Memorial Fellowship in Medical Writing to Miss Gladys Barrileaux, who will begin her studies at the University of Texas in the fall.

Evening activities, courtesy of the Charles O. Finley Co., include a hospitality hour, buffet, and transportation to a football game between the University of Texas and Texas Technological College to be held in Memorial Stadium.

Held simultaneously with the PR Conference will be an Orientation Program for provisional members.

Complete programs will be published in the September issue of the *Journal.*

The centennial of the founding of Woman's Hospital, Philadelphia, as the first training institution for nurses in America, will be noted by the issuance of a stamp to commemorate the event. The stamp should be available in the fall.

Pamphlets

Growing Up—Cerebral Palsied Children Learn to Help Themselves.—Copies are available from the National Society for Crippled Children and Adults, 2023 West Ogden Avenue, Chicago 12, Ill. Price: 25 cents. Author is Mrs. Mildred Shriner, California teacher of special education, workshop director, and wife of a physician. Included are concrete tips to make everyday living easier for cerebral palsied youngsters.

Deadly Reckoning.—The Travelers 1961 Book of Street and Highway Accident Data is another in the annual series produced by The Travelers Insurance Company. Single copies or quantities may be obtained free as long as the supply lasts. The booklet is in color, includes numerous cartoons and tables of statistics. Inquiries may be directed to J. G. O'Brien, at the company headquarters, Hartford, Conn.

A series of new pamphlets as public relations aids are now available to physicians without charge from the American Medical Association Department of Special Services, 535 N. Dearborn, Chicago 10, Ill. Among the titles are *To All My Patients,* for patients; *Winning Ways With Patients,* a 24-page manual for the doctor's receptionist, nurse, and secretary; *Do You Like to Make Decisions?,* for patients; *The Fifth Freedom,* for patients; *Why Wait?,* for patients; *What Everyone Should Know About Doctors,* limited quantities available for patients.

A new pamphlet, *"Sources of Information on Financial Aid to Medical Students"* has been published by the Association of American Medical Colleges.

The booklet lists state and national and private and government sources.

A copy may be obtained without charge by writing the Association of American Medical Colleges, 2530 Ridge Avenue, Evanston, Ill.

"Research Highlights in Aging", a booklet featuring selected articles on research in aging carried out or supported by the National Institutes of Health, has been released recently by the U. S. Department of Health, Education, and Welfare.

Additional copies of the booklet may be obtained by writing Mrs. Joe Bales Graber, Information Officer, Center for Aging Research, Division of General Medical Sciences, National Institutes of Health, Bethesda 14, Md.

"Diabetics Unknown", just published by the Public Affairs Committee, stresses the fact that there are many persons who do not know that they have diabetes. It explains the disease and methods of treating it, and emphasizes that patients with diabetes can lead as normal lives as anyone else.

"Check-ups: Safeguarding Your Health", is another Public Affairs pamphlet, which urges physicians and patients alike to value regular check-ups as a means of retaining and improving health. Both pamphlets can be ordered at 25 cents each from the Public Affairs Committee, 22 East 38th Street, New York 16.

"The ABC's of Child Safety" tells how to protect children against accidents. Designed with attractive lettering and drawings, it emphasizes that children will experiment, and cannot be protected from everything. They can, however, be taught to use common sense and to learn from experience. The pamphlet is available at 25 cents per copy from the Channing L. Bete Company, Inc., Greenfield, Mass. Special rates are available for large quantities. The name of the sponsoring organization can be printed on the back of the booklet.

Cataract and Glaucoma, Hope Through Research. This pamphlet describes these two principal causes of blindness and how the ailments may be arrested or prevented. Research at the National Institute of Neurological Diseases and Blindness at Bethesda, Md., and in other medical centers in the U.S. and abroad is described. Single copies may be obtained without charge from the U. S. Public Health Service, Washington, D. C. Orders under 100 are 15 cents a copy from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. There is a 25 per cent discount on orders of 100 or more going to one address. The pamphlet is listed as Public Health Service Publication No. 793 and Health Information Series No. 99.

Essay Contest Announced

Subjects this year for the Caleb Fiske medical essay contest are "Recent Advances in the Treatment of Malignant Disease" and "Current Status of Cardiac Surgery."

A cash prize of $500 will be awarded by the Rhode Island Medical Society to the winner of the contest; any doctor of medicine in the nation may enter. Essays must be typewritten, double spaced, and should not exceed ten thousand words. They must be submitted by December 11, 1961, to the Secretary, Fiske Fund, Rhode Island Medical Society, 106 Francis Street, Providence 3.

Iontophoresis Is Described

Dr. Wendell D. Gingrich, associate professor of ophthalmology at the University of Texas Medical Branch, has described a new kind of treatment to cure previously blinding eye infections. Corneal ulcers caused by fungus infections are being cured by mercurial compounds and by forcing certain sulfa compounds through the cornea with the aid of a faint electric current, a process known as iontophoresis.

Most serious eye infections are caused by bacteria and are best treated by the "wonder drugs," but about 1 of 50 of these cases is caused by fungi or molds. These cases show no improvement after a few days' treatment with antibiotics.

Dr. Gingrich described 10 cases to doctors attending the American Medical Association meeting in New York. A number of drugs were used after the offending organism had been identified. Only two drugs, Sulfacetamide and Thimersal were found to eradicate the fungus growths completely. All 10 patients were saved from previously certain loss of sight.

OB-Gyn Group Offers $500 Award

The Central Association of Obstetricians and Gynecologists offers an annual award of $500 for outstanding investigative or clinical work in that field. Those who wish to present papers in the competition may get full instructions from Dr. Herman L. Gardner, Secretary, 6436 Fannin Street, Houston 25. The winning paper will be included in the group's scientific program October 5-7 in Cleveland.

He Has His Little Problems

White House press secretary Pierre Salinger, given a hard time by newsmen on his reports on the President's ailing back, opened a news briefing with the greeting . . . "Fellow doctors."

As a birthday gift from the chief executive, Salinger was presented "The Family Medical Encyclopedia," by Justis J. Schifferes, M.D. The inscription read . . . "For Pierre who picks up where Schifferes leaves off." *The AMA News*, June 26, 1961

Become MD in 6 Years? Boston U. Is Trying Special New Program

Medical schooling completed in six years instead of eight may become a reality for a group of 40 freshmen who will enter Boston University this fall.

The 40 students were selected for the special six year program being inaugurated because of their exceptional qualifications. They ranked in the upper 10 per cent of college-going students across the nation on the basis of their high school scholastic averages and College Board Examination scores. They represent 14 states spreading from Maine to Washington and California. They have been admitted to both the Boston University College of Liberal Arts and the School of Medicine. Upon completion of the program, they will receive a medical degree and a bachelor of arts degree.

The six year plan was undertaken so that better physicians could be trained in less time. It will eliminate two full calendar years from the traditional eight year undergraduate and graduate education of medical students.

At the end of the first and second academic years, devoted primarily to liberal arts, the students' progress will be reviewed by a faculty committee. Those who are found ill-suited for the program, or who voluntarily leave the program, may continue their studies in the traditional liberal arts curriculum and may subsequently enter medical school as graduate students.

VA Sees Major Change In Hospital Design

Major changes in hospital design will be incorporated in the Veterans Administration's 12-year, $900,000,000 program for modernization and replacement of its obsolescent hospitals, Dr. William S. Middleton, VA chief medical director, has announced.

Changes will result chiefly in patients with tuberculosis and psychiatric illnesses being treated in general hospitals, rather than in special ones, and more automation being used. "From the use of automatic devices to move food, supplies, and records, we will pass to the autoanalyzer and electronic devices for cells counts in the laboratory, to telemetering of temperature, pulse, respiration, and blood pressure in the patient at the bedside."

Arthritis, Rheumatism Fellowships Available

The Arthritis and Rheumatism Foundation is offering predoctoral, postdoctoral, and senior investigatorship awards in the fundamental sciences related to arthritis for work beginning July 1, 1962. Deadline for applications is October 31, 1961.

These awards are intended as fellowships to advance the training of young persons of promise for an investigative or teaching career. They are not grants-in-aid in support of a research project.

(1) *Predoctoral Fellowships* are limited to bachelor's degree holders. Each applicant studying for an advanced degree must be acceptable to the individual under whom work will be done. Fellowships are tenable for one year, with prospect of renewal. Stipends range from $2,000 to $3,000 per year, depending upon family responsibilities of the Fellow.

(2) *Postdoctoral Fellowships* are limited to applicants with the degree of doctor of medicine, doctor of philosophy, or their equivalent. Again, they are tenable for one year, with prospect of renewal. Stipends range from $5,000 to $7,000 per year, depending upon family responsibilities of the Fellow.

(3) *Senior Investigator Awards* are made to candidates holding or eligible for a "faculty rank" such as instructor or assistant professor (or equivalent) and who are sponsored by their institution. Stipends are from $7,000 to $10,000 per year and are tenable for five years.

A sum of $500 will be paid to cover the laboratory expenses of each postdoctoral Fellow. An equal sum will be paid to cover either the tuition expenses or laboratory expenses of each predoctoral Fellow. In the case of senior investigators, instead of the $500, an additional 10 per cent of the stipend will go to the institution to be applied to annuity programs, laboratory expenses, travel, etc.

For further information and application forms, those interested should address Dr. R. W. Lamont-Havers, Medical Director, Arthritis and Rheumatism Foundation, 10 Columbus Circle, New York City 19.

Gastroenterology Fellowship

A fellowship in gastroenterology will be available January 1, 1962, at Scott and White Clinic, Scott and White Memorial Hospital, and Scott, Sherwood and Brindley Foundation, Temple. Dr. J. Arnold Bargen, Scott and White Clinic, Temple, can provide complete details.

Postgraduate Courses

Bronchogenic Carcinoma, Dallas, October 13-14.—The University of Texas Southwestern Medical School at Dallas and the Dallas Tuberculosis Association will sponsor the Ivan H. Mattson Memorial Symposium on Bronchogenic Carcinoma on October 13 and 14. Besides resident faculty members of the University of Texas, four guest faculty members have been named. They are Dr. R. Adams Cowley, chief of the Division of Thoracic Surgery, University of Maryland, Baltimore; Dr. David A. Karnofsky, attending physician, Department of Medicine, James Ewing Hospital and member of the Sloan-Kettering Cancer Center, New York, N.Y.; Dr. Guy Owens, chief of the Neurosurgery Department, Roswell Park Memorial Institute, Buffalo, N.Y.; and Dr. John Steele, chief of the Surgical Service, San Fernando Veterans Administration Hospital, San Fernando, Calif.

Fourteen hours of Category I credit will be given to members of the Academy of General Practice. Further information may be obtained from the Executive Director, Dallas Tuberculosis Association, 3925 Maple Avenue, Dallas 19.

Overseas Medical Events Listed

A comprehensive calendar of overseas medical congresses and allied events during the period October, 1961, through December, 1962, is being made available by Scandinavian Airlines System. All known medical events in areas served by the airline will be listed.

A brochure outlining the program offered by the American Medical Society of Vienna also may be obtained from SAS. The society holds practical courses in dermatology, syphilology, internal medicine, neurology, psychiatry, obstetrics, gynecology, ophthalmology, orthopedic and traumatic surgery, otorhinolaryngology, pathology, pediatrics, radiology, and surgery.

Details can be obtained from SAS offices or by writing to A. John Harrison, secretary, Medical Travel Section, Scandinavian Airlines System, 138-02 Queens Blvd., Jamaica 35, N. Y.

St. Mary's Plans Pharmacy School

St. Mary's University, San Antonio, will become the fourth university in Texas with a school of pharmacy. A three year professional program will be added in September, 1962, to the current two year pre-professional training program.

Other Texas universities with pharmacy schools are the University of Texas, University of Houston, and Texas Southern University.—*Texas Pharmacy,* August, 1961.

Personals

Dr. W. J. Campbell, has been re-elected president of the Amarillo school board.

Dr. Oscar Kirksey, Galveston, heads that city's new chamber of commerce committee on public health. Other physicians on the committee are Drs. *Sol Forman, J. L. Jinkins, Jr., John McGivney, Lou McKenna, E. S. McLarty, Carl A. Nau,* and *William R. Ross.*

Mr. Charles Allan Bray, Dallas, a third year student at University of Texas Southwestern Medical School, has been awarded a $600 scholarship for research and training in allergic diseases by the Allergy Foundation of America.

Mr. Jesse Lee Wallace of Houston, a senior at Baylor University College of Medicine, has been awarded a Burroughs Wellcome Summer Scholarship for research and clinical training in the field of allergies.

Dr. H. H. Latson, Amarillo, is a new fellow of the American College of Chest Physicians.

Mrs. Allen T. Stewart died June 21, 1961, in a Lubbock hospital. She had been ill for some months. She is survived by her husband, *Dr. Allen T. Stewart,* two daughters, and a son.

Sharon Elizabeth Jones was born to *Dr. and Mrs. Billy Rual Jones* of Amarillo on June 9.

Dr. Thomas D. Cronin, Houston, has been appointed representative of the American Association of Plastic Surgeons to the American Board of Plastic Surgery.

Dr. H. Vincent Walker is a member of the Plumbing Appeals and Advisory Board of San Antonio. Other San Antonio physicians taking part in civic affairs include *Dr. Leo Galindo,* a member of the Library Board; *Drs. Stanley Stain, Thomas Romo, Jr.,* and *Jack Wright* who are on the Public Health Committee, and *Dr. J. L. Cochran,* who serves on the City-County Tuberculosis Control Board.

Three physicians from the University of Texas Medical Branch at Galveston were among lecturers for Peace Corps recruits training at Texas Western University in El Paso recently. The men were *Dr. Don Micks,* professor of preventive medicine and public health, who gave lectures on tropical medicine; *Dr. William J. McGanity,* professor of obstetrics and gynecology, whose subject was disease prevention, personal hygiene and immunity, and nutrition; and *Dr. J. Fred Mullins,* professor of dermatology, who taught courses in skin diseases and the handling of poisonous reptile bites.

Drs. A. L. LeBlanc, Eli Zonana, and *William Sullivan,* all of the University of Texas Medical Branch, Galveston, have received grants totaling $10,800 from the Galveston county chapter of the American Cancer Society. The grants are to be used to support various research projects.

Dr. Edwin G. Troutman has assumed his duties as the new director of medical education at Harris Hospital in Fort Worth. Dr. Troutman formerly was assistant to the dean of medicine and medical director of the outpatient department of the Medical Branch in Galveston.

An Institute of Environmental Health will be organized next year at the University of Oklahoma Medical Center, and *Dr. Carl A. Nau,* chairman of the department of preventive medicine and public health at the Medical Branch, Galveston, will take a year-long leave of absence from his present duties to direct the organization of the Institute. *Dr. Don W. Micks* will be acting department chairman during Dr. Nau's absence.

Dr. Micks also is making news by being one of the instructors in tropical medicine for recruits to the Peace Corps in El Paso. Other instructors from the Medical Branch are *Dr. J. Fred Mullins,* dermatology, and *Dr. W. J. McGanity,* obstetrics and gynecology. The Peace Corps is being trained for a mission to Tanganyika.

Dr. Morris Pollard, who had directed the Medical Branch's virus laboratory since 1946, has resigned to accept a position as director of the Lobund Institute, a laboratory research center at the University of Notre Dame, South Bend, Ind.

Mrs. J. Guy Jones of Dallas, Past President of the Dallas County Woman's Auxiliary to the Texas Medical Association, died July 13 at her home. She had been ill only a short time. Her husband, a Dallas ophthalmologist, is among her survivors.

Dr. Robert M. O'Neal has been appointed professor and chairman of the Department of Pathology at Baylor University College of Medicine. He succeeds *Dr. Stuart A. Wallace,* who has retired as chairman of the department but who will continue in his position as senior professor.

Texans Win AMA Exhibit Awards

Texas physicians numbered among the scientific exhibit award winners at the June meeting of the American Medical Association in New York.

Among those cited:

Dr. N. C. Hightower, Jr., Dr. J. A. Bargen, Dr. A. C. Broders, Jr., Dr. R. D. Haines, and *Dr. Henry Laurens,* all of Scott and White Clinic, Temple. Their exhibit "Contributions of a Gastrointestinal Laboratory to Clinical Gastroenterology" won honorable mention in the Section on Gastroenterology and Proctology.

Dr. Robert H. Moser, Dr. Perry C. Smith, and *Dr. William P. Nelson* of Brooke General Hospital, Brooke Army Medical Center, Fort Sam Houston. Their exhibit, "Urinary Sediment" won honorable mention in the Section on Military Medicine.

Charles H. Dukes, Ph.D., Hilda H. Fox, and *Dr. L. J. Girard* of Baylor University College of Medicine, Houston, won a certificate of merit for their exhibit "In Vitro Reactivity of Human Ocular Tissues to Pharmacological Agents" in the Section on Ophthalmology.

Dr. E. Burke Evans, Dr. G. W. N. Eggers, and *Dr. Ross T. Frick* of the University of Texas Medical Branch at Galveston. Their exhibit "Non-Rigid Fixation in the Open Treatment of Fractures" won honorable mention in the Section on Orthopedic Surgery.

Dr. Abraham T. K. Cockett, School of Aviation Medicine, United States Air Force Aerospace Medical Center, Brooks Air Force Base; and *Dr. Willard E. Goodwin* of the University of California Medical Center, Los Angeles. Their exhibit, "An Apparatus for Regional Kidney Hypothermia" won honorable mention in the Section on Urology.

Dr. Wendell D. Gingrich and *Mary E. Pinkerton,* Ph.D., of the University of Texas Medical Branch at Galveston won a certificate of merit for medical photography for "Ocular Fungus Infections."

Medical Center Develops Portable X-Ray Dark Room

University of Texas Medical Center personnel in Galveston have developed a portable dark room for high speed, bedside development of standard size x-ray photographs.

Utilizing conventional x-ray film and high speed developing compounds, negatives are developed in 20 seconds, and wet negatives are ready for on-the-spot viewing by the physician in less than 90 seconds. The portable dark room's advantages in a large hospital where operating rooms and specialized departments are often many floors, or several buildings removed from the radiology center are great, and its possibilities for field use in civil and military emergency units are obvious.

An experienced technician can be trained to use the device in one day.

The Develmobile, as it is named by x-ray technician Richard Brown, its chief architect, is the size of a home refrigerator, weighs 80 pounds, and costs about $300 to construct—less than one-tenth the cost of a standard hospital or office x-ray dark room. It can be used wherever AC or DC current outlets are available.

Dr. Robert N. Cooley, professor and chairman of the radiology department, says that the new unit offers great possibilities in relieving patient discomfort and providing the doctor with almost instant information in cases in which speed is essential. The unit has been tested in several clinical departments.

Parkinson's Disease Second Among Neurologic Diseases

Parkinson's disease ranks second in the United States among all neurologic diseases, according to *Patterns of Disease,* monthly Parke, Davis & Company publication for physicians. Convulsive disorders are first, with an estimated incidence of 500,000 to 1,500,000; Parkinson's disease follows closely with 300,000 to 1,500,000; primary tumors of the brain, pituitary and spinal cord, 65,000 to 190,000; and multiple sclerosis, ranks fourth with 80,000 to 150,000.

The disease strikes more persons in the sixth decade of their lives than in any other—35 per cent of Parkinsonian patients are stricken between 51-60 years of age. Males account for an estimated 55 to 65 per cent of persons afflicted by the disease.

UT Buys Nuclear Reactor For Science Instruction

A nuclear reactor, designed to achieve effectiveness in teaching and research in the field of nuclear energy, will be acquired by the University of Texas. It will be constructed by General Dynamics Corporation's General Atomic Division for installation in the University's College of Engineering.

As a research tool, the reactor also will be available to students and faculty members in engineering and other fields including physics, chemistry, microbiology, botany, and zoology.

The reactor will first be utilized in teaching in the fall semester of 1962. Use of this reactor will assist the student in developing sound judgment in applying scientific, mathematical, economic, and other fundamental principles, says J. A. Scanlan, Ph.D., who will direct the Nuclear Reactor Laboratory.

The University of Texas is the sixth U. S. university, and first in the South, to purchase this particular type (TRIGA Mark 1) reactor for teaching, research, and isotope production.

Mentally Ill Escape Common Physical Ailments

Many common physical ailments appear to be of inconsequential occurrence among persons with severe mental illness.

Among hundreds of mentally ill veterans studied during the past 15 years, not a single case of hay fever was discovered, and only one case of asthma was found. Rheumatoid arthritis was rare. The study was made at the Bedford, Mass., Veterans Administration Hospital.

The investigation further revealed that most neuropsychiatric patients do not complain of physical pain even with perforation of peptic ulcers, acute appendicitis, and severe heart attacks.

Any slight change in the patient's behavior or lapse from his usual routine may be an indication of serious illness. Drs. Walter E. Marchand and Otto F. Ehrentheil have summed up their findings in a book, "Clinical Medicine and the Psychotic Patient," which is expected to stimulate further research in this no man's land between psychiatry and internal medicine.

Dr. Milford O. Rouse, Dallas, Vice Speaker of the AMA House of Delegates, congratulates Dr. Norman A. Welch, Boston, Speaker of the House. Both men were re-elected to their offices during the June meeting of the AMA in New York.

Portable Heart-Lung Machine Gives Efficient Performance

A portable heart-lung machine weighing less than 50 pounds has been developed in the surgical research laboratory of Baylor University College of Medicine in Houston.

Surgeons and technicians credited with developing the device said that it performs as efficiently as larger, conventional pump-oxygenators. Because of its mobility, it can be of great value in emergencies arising in small hospitals and clinics that do not keep a heart-lung machine on the premises. Drs. Michael E. DeBakey, Denton A. Cooley, and Arthur Beall perfected the small machine; they note that it is easily portable in a car.

Ob-Gyn Board Requirements

The American Board of Obstetrics and Gynecology no longer requires case reports from the physician in order that he may complete Part 1 of the examination. In lieu of these reports, the candidate will be required to submit a duplicate certified typewritten list of patients dismissed from each hospital during the preceding 12 months. This applies to all candidates.

Current bulletins may be obtained from Dr. Robert L. Faulkner, Executive Secretary, 2105 Adelbert Road, Cleveland 6. The next scheduled examination will be on January 5, 1962.

Vitamin H_3 and Aging

"Vitamin H_3" is the name Professor Anna Aslan of Bucharest, Rumania, gives to a 2 per cent solution of procaine adjusted to a pH of between 3.3 and 5.0. Her treatment for a wide variety of conditions, senility included, consists of intramuscular injections of 5 ml. of H_3 three times a week for a series of 12 injections. This is repeated indefinitely, with a ten day interval between each series of injections.

Articles from Iron Curtain countries generally support Professor Aslan's theories. Reports from the West are more skeptical, and indicate that the therapeutic claims are not supported by objective evidence.

The following bibliography lists articles on "H_3" Procaine which are available from the Memorial Library.

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Chiu, G. C.: "Rejuvenating" Effects of Procaine: A Critical Review of Reports, J.A.M.A. 175:502 (Feb. 11) 1961.

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Gorbadei, N. K.: Intra-arterial Infusion of Procaine in Therapeutic Practice, New York, Consultants Bureau, Inc., 1960.

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Lueth, P.: A Review of Procaine-Therapy in Elderly Individuals, J. Geront. 15:395 (Oct.) 1960.

Marx, H.: "H_3" in the Battle Against Old Age, New York, Plenum Press, 1960.

Oury, P., and Duche, G.: Procaine; Eutrophic Action in Gerontology, Pr. Med. 67:2219 (Dec. 19) 1959 (Fr.).

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Romero Perez, M. A.: Reconstituting Medication in Geriatrics; Factor H_3 Alone and Combined with Other Therapeutic Agents, Sem. Med. (B. Air) 117:1442 (Oct. 31) 1960 (Sp.).

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Ackerknecht, E. H.: A Short History of Medicine, New York, Ronald Press, 1955.

Alexander, L.; Berkley, A. W.; and Alexander, A. M.: Multiple Sclerosis Prognosis and Treatment, Springfield, Ill., Charles C Thomas, 1961.

Alonso, E. M.: Memoirs of a Medico, Garden City, Doubleday, 1961.

Bock, K. E., and Cottier, P. T., Eds.: Essential Hypertension, an International Symposium, Berlin, Springer-Verlag, 1960.

Ciba Foundation Symposium: Quinones in Electron Transport, Boston, Little, Brown, 1961.

Ciba Foundation Study Group: Virus Meningo-Encephalitis, Boston, Little, Brown, 1961.

Gale Research Company: Encyclopedia of Associations, vol. 1: National Organizations of the U. S., Detroit, Gale Research Company, 1961.

Goth, A.: Medical Pharmacology, St. Louis, C. V. Mosby, 1961.

Krapf, E. E.: Psychiatry, vol. 1: Principles, New York, Grune and Stratton, 1961.

Marx, H.: "H3" in the Battle Against Old Age, New York, Plenum Press, 1960.

McCluggage, R. W.: A History of the American Dental Association, Chicago, American Dental Association, 1959.

Mullan, S.: Essentials of Neurosurgery, New York, Springer, 1961.

National Academy of Sciences and National Research Council: Scientific and Technical Societies of the United States and Canada, ed. 7, Washington, Authors, 1961.

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Perkins, E. W.: Aseptic Technique for Operating Room Personnel, Philadelphia, Saunders, 1959.

Rook, A.: Progress in the Biological Sciences in Relation to Dermatology, Cambridge, Cambridge University Press, 1960.

Sheldon, W. H.: Varieties of Temperament, New York, Harper and Brothers, 1942.

Somers, H. M., and Somers, A. R.: Doctors, Patients, and Health Insurance, Washington, Brookings Institute, 1961.

Gifts to the Library

L. Gayle Burton, M.D., Woodville, 33 journals, 6 books.

Clinical Pathology Laboratory, Austin, 174 journals.

Charles M. Darnall, M.D., Austin, 2,246 journals.

Charles B. Dildy, M.D., Austin, 44 journals.

Mrs. O. E. Egbert, El Paso, 157 journals.

John D. Gleckler, M.D., Denison, 622 journals.

Stanley Hillis, M.D., Austin, 491 journals, 76 reprints.

Robbie C. Jordan, M.D., Austin, 118 journals.

Mrs. J. N. Keith, Austin, 2 books.

Sam N. Key, Jr., M.D., Austin, 59 journals.

William C. King, M.D., Austin, 12 journals.

John K. Kirby, Ph.D., Austin, 39 journals.

Joseph T. Phillips, M.D., Austin, 69 journals.

John R. Rainey, Jr., M.D., Austin, 61 journals.

Benjamin F. Simms, M.D., Austin, 469 journals, 25 reprints, 1 set of records, 27 books.

John D. Weaver, M.D., Austin, 360 journals, 24 reprints.

G. K. Womack, M.D., Austin, 23 journals.

New Films

SAFETY THROUGH SEATBELTS (1960) sound, black and white, 12 minutes, 16 mm., C-111.

Here, for the first time, it is proved that intersection collision forces far exceed the ability of any human being to resist them. But, *Safety Through Seat Belts* shows how your life may be saved; it proves that safety doesn't happen by accident. This film will be of interest to all persons interested in and responsible for driver safety education.

CAREER OF THE SPIRIT (1960) sound, color, 13½ minutes, 16 mm., C-109.

This auxiliary film depicts the benevolent yet business-like role of the auxiliary in bringing the hospital and the community closer together through efficient good will.

These films are available on loan without charge from the film library of the Texas Medical Association.

Studies on Vertebrate Neurogenesis

PROF. SANTIAGEO RAMON Y CAJAL, Faculty of Medicine, University of Madrid. Translated by LLOYD GUTH, M.D., National Institute of Neurological Diseases and Blindness, National Institutes of Health, Public Health Service, Department of Health, Education and Welfare, Bethesda, Md. 405 pages. $13.50. Springfield, Ill., Charles C Thomas, 1960.

Dr. Guth states that the publication of the present English translation partially fills the gap in the knowledge of vertebrate neurogenesis. He has attempted to render Cajal's text into current scientific English and still maintain the atmosphere of the original text. Some chapters and parts have been rearranged and an author and subject index added. The book should be valuable to neurologists and embryologists, and it should also interest the biology student.

Current Therapy—1961

HOWARD F. CONN, M.D., Ed. 806 pages. $12. Philadelphia, W. B. Saunders Company, 1961.

The 13th edition of Current Therapy is not just a new edition, but essentially a new book, for of the 307 articles in this 1961 edition, 254 are new. Many of those that are carried over from previous years have been revised and brought up to date.

In spite of Senator Kefauver giving the public the idea that the pharmacist and practitioner are not aware of the uses of drugs, the ethical manufacturers are better able to predict the pharmacological action of the products and to maintain rigid quality and purity control in every respect. However, a therapeutic agent has to stand the test of time. This book brings out the drugs that have passed to be the best in treating of various conditions. In the 1961 edition, there are several errors, but the Saunders Company has sent out information to correct these errors. This is the first time in eight years that there have been any significant errors.

This book should be on the shelf of every practitioner, whatever his specialty, because it is broad in its coverage and has excellent authorities to back up this therapy.

Inside the front cover is a list of normal laboratory values of clinical importance that is continued inside the back cover. There is also an excellent table of contents in front, with a complete index in the back. Roster of drugs is also included with package information and a table of pediatric dosage.

—John W. Tunnell, M.D., Taft.

DR. D. K. BARNES

DR. D. K. BARNES

Dr. Dorsey King Barnes, assistant professor of orthopedic surgery at Southwestern Medical School, Dallas, died June 24, 1961, after a heart attack.

He was born in Waco April 9, 1911, and was the son of Frank L. and Blanche (King) Barnes. He attended public schools and Baylor University in Waco, and in 1937 was graduated from Baylor University College of Medicine in Dallas. After interning at Colorado General Hospital, Denver, he spent two years in residency at Carrie Tingley Hospital for Crippled Children, Hot Springs, N. Mex., and a year as a resident in Denver General Hospital, Denver. He then was awarded a fellowship for further study at the Carrell-Girard Clinic in Dallas.

He began practicing in Dallas in 1941, and was on the staffs of Baylor Hospital, Parkland Memorial Hospital, and Scottish Rite Hospital for Crippled Children.

Dr. Barnes was certified by the American Board of Orthopedic Surgery and was a past president of the North Texas Chapter of the Western Orthopedic Association. He also was a member of the Dallas County Medical Society, Texas and American Medical Associations, Dallas Southern Clinical Society, American Academy of Orthopedic Surgeons, Texas Rheumatism Society, Central Orthopedic Club, American Association of Railroad Surgeons, and Phi Alpha Sigma medical fraternity.

Also Little Brothers Journal Club of Dallas, Southern Medical Association, American Rheumatism Association, Texas Orthopedic Association, and Western Orthopedic Association of which he was vice president at the time of his death.

He was a member of the Highland Park Methodist Church. He also had some ranching interests and enjoyed hunting and fishing.

Miss Margaret McCollum of Waco and Dr. Barnes were married April 4, 1936, in Dallas. Survivors are Mrs. Barnes; a son, Robert Dorsey Barnes of Dallas and Bryan, and a daughter, Mrs. Donald H. (Margaret Sue) Wills of Wichita Falls; three brothers, Frank Barnes, Dallas; Jack Barnes, Houston, and Keith Barnes, Los Angeles; and two sisters, Mrs. Don Hunt, Portsmouth, N. H., and Mrs. J. W. Stubblefield, Monahans.

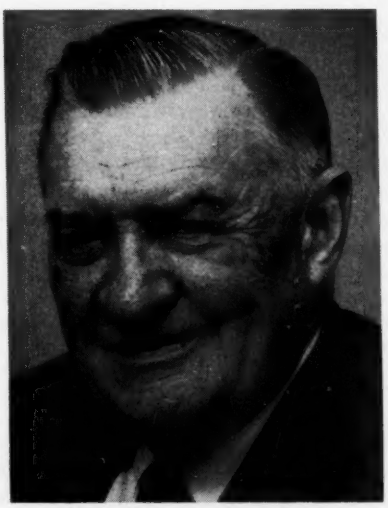
RECENT

DR. L. M. COCHRAN

Dr. Leroy Merrell Cochran, manager of McCloskey Veterans Administration Hospital in Temple, died June 22 in a local hospital. He had been ill only a short time.

A descendant of two pioneer Dallas county families, he was the son of William M. and Mary Ethel Cochran, and was born near Dallas on December 5, 1896. He attended Dallas public schools and Southern Methodist University, and was graduated from the University of Texas Medical Branch, Galveston, in 1923. After interning at John Sealy Hospital, Galveston, he was in private practice in Dallas, 1924-1934, and also served on the medical staff with the Veterans Administration after 1925. In 1934 he accepted a staff position with the VA Hospital in Des Moines, Iowa. He was transferred to Tuscaloosa, Ala., in 1938, and in 1940 he assisted in activating the new VA Hospital in Montgomery, Ala.

He became chief medical officer at Jefferson Barracks, Mo., in 1941, and in 1944 he was called



DR. L. M. COCHRAN

DEATHS

to active duty with the Army Medical Corps; he was commissioned a lieutenant colonel. First assigned as clinical director of the VA Hospital in Dallas, he later was transferred to Amarillo as manager of the hospital there. He entered the U. S. Army Reserve with the rank of colonel.

In 1946, Dr. Cochran was named manager of the Veterans Administration Hospital in Temple at the time it was transferred from McCloskey Army General Hospital to the Veterans Administration. He directed the extensive development and expansion of the hospital from the admission of its first peacetime patient to its present capacity of 800 hospital and 390 domiciliary beds. Under his management, a total of 59,882 patients were admitted and discharged from the hospital and domiciliary.

In April of 1961, Dr. Cochran completed 38 years of service to the Federal Government.

Dr. Cochran was a member of the Bell County Medical Society, Texas Medical Association, American Medical Association, 12th District Medical Society, Southern Medical Association, Alpha Omega Alpha honorary medical fraternity, and Phi Chi medical fraternity. He held membership on the Central Texas Area Hospital Council and American College of Hospital Administrators.

Active also in civic affairs, he was a director of the Bell County Tuberculosis Association and Temple's United Fund, and was a member of the Temple Chamber of Commerce, the American Legion, the Kiwanis Club, and the First Methodist Church.

Survivors are Mrs. Cochran, the former Miss Marguerite Renaud; a son, Leroy Merrell Cochran, Jr., Dallas; a daughter, Mrs. Rodman A. (Rosemary) Sharp, LaJolla, Calif.; and five grandchildren.

DR. E. W. APPLEBE

Dr. Edward Whately Applebe, 75, British-born neuropsychiatrist, died at his Houston home April 12, 1961.

He was born in Hay, Wales, Great Britain, on February 22, 1886, the son of Dr. Edward Alexander Applebe and Alice W. (Cowper) Applebe. He attended Mallam's Preparatory School, Leamington, England; Eastman's Royal Naval Academy, and Cambridge University, England. In 1917, Dr. Applebe received his medical degree from the University of Texas Medical Branch, Galveston. He did his residency at the New York Neurological Institute, New York City, and made postgraduate studies in London, Paris, and Vienna.

Dr. Applebe was at one time assistant superintendent of the Kansas State Hospital for Epileptics, was county alienist for Harris County from 1932 to 1934, and was formerly on the staffs of St. Joseph's and Jefferson Davis Hospitals. He was a member of the American Medical Association, was elected to honorary membership in the Texas Medical Association in 1952, and belonged to the Harris County Medical Society.

As a hobby, Dr. Applebe belonged to the Society of American Magicians.

Survivors include his wife, the former Miss Inez Cartledge, whom he married in Houston in 1947; one daughter, Mrs. G. M. Moser of Grant's Pass, Ore.; a son, E. W. Applebe, Jr., of Liberty; and a sister, Miss Mary Applebe of Sussex, England.

DR. G. H. WOOD

Dr. George Harden Wood, Big Spring, died at his home June 17, 1961. He had practiced in Big Spring since 1933, and was associated with the Wood-Fish Clinic there.

Born in Batesville, Miss., August 18, 1904, he was the son of George Harden and Bess (Spencer) Wood. He was educated in the Batesville public schools, and received his B.S. degree from the University of Mississippi in 1927. At Tulane University School of Medicine, he completed his medical education in 1929, and interned one year in Charity Hospital, New Orleans. He spent the following two years in residency at New Orleans E.E.N.T. Hospital.

Dr. Wood spent his first year in practice in Longview, then moved to Big Spring and specialized in eye, ear, nose, and throat diseases in association with the Hall-Bennett Clinic.

He was a member of the Texas and American Medical Associations through the Howard-Martin-Glasscock Counties Medical Society, and was certified in 1945 by the American Board of Otolaryngology. He was a member of the American Academy of Ophthalmology and Otolaryngology.

DR. G. H. WOOD

He was chairman of the board of stewards of the First Methodist Church and was general chairman of the building committee for its new sanctuary. He also served as president of the YMCA, was a member of the American Legion, Sigma Alpha Epsilon social fraternity, and Phi Chi medical fraternity. He was one of the founders of the Toastmasters Club.

During World War II, he served as a captain in the Air Force and was stationed at Pampa.

Dr. Wood was married October 12, 1932, in Greenwood, Miss., to Miss Frances Gray. Survivors are Mrs. Wood, two sons now serving in the U. S. Navy, Lt. George Harden Wood III, Formosa, and Ensign Harris Spencer Wood, Guantanamo Bay, Cuba; a daughter, Frances Lenieu Wood, Big Spring; three brothers, Dr. C. S. Wood, New Orleans; Jack Wood, Rosedale, Miss.; and Murphy Wood, Memphis, Tenn.; and a sister, Mrs. Chess Hawken, Batesville, Miss.

DR. F. J. STANISLAV

Dr. Frank Joseph Stanislav, who had practiced in Waco since 1919, died July 5, 1961, following a heart attack.

Dr. Stanislav was born and reared in the West community near Waco, and attended the old St. Basil College for three years before entering St. Louis University Medical School, from which he was graduated in 1916. His internship and residency were spent in Providence Hospital, Waco.

Opening his office in Waco in 1919, he maintained a surgery and general practice until his retirement about a year ago. He also was an instructor at the Providence School of Nursing for 25 years.

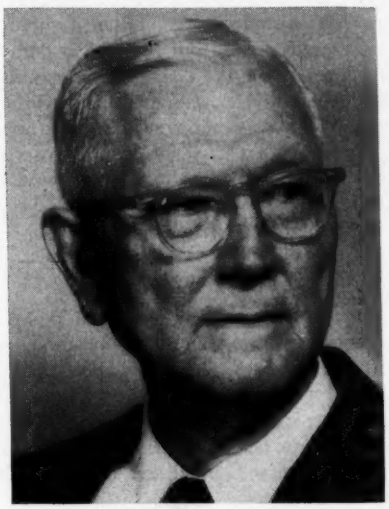
During World War I, he was a first lieutenant in the Army Medical Corps, and served in the United States, France, and Germany. He was a medical examiner for the Selective Service System from 1942 until the time of his retirement.

He was a member and past president of the McLennan County Medical Society, and held membership in the Texas Medical Association, American Medical Association, Knights of Columbus, and St. Mary's Catholic Church. As a hobby, Dr. Stanislav enjoyed fishing.

Son of Mary (Marek) and John Stanislav, he was born November 16, 1886. On June 19, 1917, he and Miss Meta Loesch were married in Waco. She survives, as do a daughter, Mrs. Helen Heltzel, Tulsa; two brothers, August S. and Rudolph Stanislav, both of West; two sisters, Miss Bertha S. Stanislav and Mrs. Mary Opella, both of West; and three grandsons.

DR. W. L. HUDSON

Dr. Lee Hudson, twice president of the Dallas County Medical Society, retired Chief of Surgery, Parkland Hospital, and Emeritus Professor of Surgery, University of Texas Southwestern Medical School, died of an acute myocardial infarction at his Dallas home June 11, 1961.



DR. LEE HUDSON

The son of Dr. Taylor Hudson and Lizzie Long Hudson, Dr. Lee Hudson was born in Belton, October 13, 1892. His father was the 23rd President of the Texas Medical Association. His grandfather, Dr. John Wesley Hudson, was a physician in San Saba during the time of the Civil War.

His second election to the Dallas County Society presidency was indicative of his strong leadership during a period of local medical tribulation and growing national concern that the newly organized hospitalization plans might mutate into State medicine.

After his graduation from Belton High School, he took his pre-medical work at the University of Texas, entered its Medical Branch in Galveston in 1912 and received his M.D. degree there in 1916. Following his graduation in medicine, Dr. Hudson went to New York City and served as house physician and house surgeon at St. Mary's Hospital for Children, and had his formal surgical residency training at St. Luke's Hospital.

In 1920, Dr. Hudson opened his office in Dallas and was appointed to direct the emergency clinic in the City Hall. He formulated progressive plans for

the development of Parkland Hospital, and newspaper reports thereafter always identified him as the Parkland Chief Surgeon.

The Dallas Medical Journal in January, 1938, made note of his efforts: "Dr. Hudson has contributed much toward the advancement of scientific medicine in Parkland Hospital. He and his conferees on the so-called Open Staff have been most cooperative in reorganizing the medical and surgical facilities of the hospital.

"Realizing that if a different system could be developed to the satisfaction of the profession, these patients would profit thereby, Dr. Hudson has been one of the important factors in effecting such a change."

Dr. Hudson continued as Chief of Surgery at Parkland Hospital until he retired from the active position in 1949.

In 1938 Dr. Hudson served ably as President of the Dallas County Medical Society, and in his own words, "I wasn't always right, but I was never in doubt and never reluctant to state my opinions". Confident of Dr. Hudson's abilities as fearless spokesman, the Dallas County Medical Society elected him to serve for a second year. He appointed Dr. Frank A. Selecman as chairman of the committee to study proposals for health plans. When the nation's first group hospitalization plan was organized under Baylor Hospital auspices in July, 1939, Dr. Hudson and Dr. Selecman were supporters of the plan and were high in its praise. In boosting the plan which was to evolve into Blue Cross Dr. Hudson's opposing views regarding state medicine were reported in the Dallas Times Herald, "I do not believe our medical care would be improved by a system that promotes a man on account of his political sagacity rather than his professional ability."

In addition to his work at Parkland Hospital Dr. Hudson was a member of the staff at the Medical Arts Hospital, St. Paul's Hospital, and Baylor Hospital. He was a member of the Texas Surgical Society, and he was one of the founding members of the Dallas Society of General Surgeons. In 1936 he was President of the North Texas Medical Association. He was a member of the Sigma Chi and A. M. P. O. fraternities, Alpha Omega Alpha Honor Medical Society, and the Dallas Country Club and Idlewild Club.

Due to a pulmonary infection Dr. Hudson closed his office in April, 1950, and retired from medical practice.

Dr. Hudson continued to devote time to civic projects. He was particularly pleased to have time for his hobby of gardening. His home and lawn became a showplace, particularly for his success in the culture of camellias.

Dr. Hudson was married in 1926 to Miss Sarah Dorsey Brown of Kaufman, who survives him, as do two sisters, Mrs. Robert R. Penn of Dallas and Mrs. Mary Davidson of Mineral Wells.

★ Coming Meetings

American Medical Association, Clinical Meeting, Denver, Nov. 27-30, 1961. Dr. F. J. L. Blasingame, 535 N. Dearborn, Chicago 10, Exec. Vice-Pres.

Texas Medical Association, Austin, May 12-15, 1962. C. L. Williston, 1801 N. Lamar, Austin, Exec. Sec.

Current Meetings

AUGUST

American Congress of Physical Medicine and Rehabilitation, Cleveland, Aug. 27-Sept. 1, 1961. Dorothea C. Augustin, 30 N. Michigan, Chicago 2, Exec. Sec.

Texas State Board of Medical Examiners, Fort Worth, Aug. 26-27, 1961. Dr. M. H. Crabb, 1714 Medical Arts Bldg., Fort Worth, Sec.

SEPTEMBER

American Hospital Association, Sept. 25-28, 1961. Mr. M. J. Norby, 840 North Lake Shore Dr., Chicago 11, Sec.

American Society of Clinical Pathologists, Seattle, Sept. 30-Oct. 8, 1961. Miss Eleanor F. Larson, 445 Lake Shore Drive, Chicago 11, Mgr.

Southwest Regional Cancer Conference, Fort Worth, Sept. 24, 1961. Mrs. I. F. Ball, Westchester House, Fort Worth, Sec.

Texas Chapter, American Academy of Pediatrics, Harlingen, Sept. 22, 1961. Dr. W. W. Kelton, Jr., 108 W. 30th, Austin, Sec.

Texas Heart Association, Houston, Sept. 15-17, 1961. Mr. E. T. Guy, 404 Jesse H. Jones Library Bldg., Houston 25, Exec. Dir.

Texas Pediatric Society, Harlingen, Sept. 22-23, 1961. Dr. C. E. Gilmore, 811 Bonham, Paris, Sec.

National and Regional

American Academy of Allergy, Denver, Feb. 5-7, 1962. Mr. J. O. Kelley, 756 N. Milwaukee St., Milwaukee 2, Exec. Sec.

American Academy of Dermatology and Syphilology, Chicago, Dec. 2-7, 1961. Dr. R. R. Kierland, Mayo Clinic, Rochester, Sec.

American Academy of General Practice, Las Vegas, April 6-13, 1962. Mr. M. F. Cahal, Volker Blvd., at Brookside, Kansas City 12, Exec. Sec.

American Academy of Ophthalmology and Otolaryngology, Chicago, Oct. 8-13, 1961. Dr. W. L. Benedict, 15 2nd St. S.W., Rochester, Minn., Sec.

American Academy of Pediatrics, Chicago, Oct. 2-5, 1961; New York, April 30-May 2, 1962. Dr. E. H. Christopherson, 1801 Hinman, Evanston, Ill., Exec. Dir.

American Association of Genito-Urinary Surgeons, Skytop, Penn., May 9-11, 1962. Dr. W. J. Engel, 2020 E. 93rd, Cleveland 6, Sec.

American Association of Obstetricians and Gynecologists. Dr. C. L. Randall, 216 Summer, Buffalo 22, Sec.

American Association of Plastic Surgeons, Del Monte, Calif., May 6-10, 1962. Dr. T. D. Cronin, 6615 Travis, Houston 25, Sec.

American Association for Thoracic Surgery, St. Louis, April 16-18, 1962. Dr. H. T. Bahnson, Johns Hopkins Hosp., Baltimore 5, Sec.

American Cancer Society, New York, Oct. 23-24, 1961. Mr. G. Whittlesey, 521 W. 57th, New York 19, Sec.

American College of Allergists, Minneapolis, April 1-6, 1962. Mr. E. Bauers, 2160 Rand Tower, Minneapolis, Exec. Vice-Pres.

American College of Chest Physicians, Denver, Nov. 25-27, 1961. Mr. M. Kornfeld, 112 E. Chestnut, Chicago 11, Exec. Dir.

American College of Gastroenterology, Cleveland, Oct. 22-25, 1961. Mr. D. Weiss, 33 W. 60th, New York 23, Exec. Dir.

American College of Obstetricians and Gynecologists, Chicago, April 2-5, 1962. Mr. D. F. Richardson, 79 W. Monroe, Chicago 3, Exec. Sec.

American College of Physicians, Philadelphia, April 9-13, 1962. Dr. E. C. Rosenow, Jr., 4200 Pine, Philadelphia 4, Exec. Dir.

American College of Radiology, New York, Feb. 7-10, 1962. Mr. W. C. Stronach, 20 N. Wacker, Chicago 6, Exec. Dir.
American College of Surgeons, Chicago, Oct. 2-6, 1961. Dr. W. E. Adams, 40 East Erie, Chicago, Sec.
American Dermatological Association, Chandler, Ariz., March 28-31, 1962. Dr. C. T. Nelson, 630 West 168th, New York 32, Sec.
American Gynecological Society, Hot Springs, Va., May 31-June 2, 1962. Dr. C. J. Lund, 260 Crittenden Blvd., Rochester 20, N. Y.
American Heart Association, Miami Beach, Oct. 20-24, 1961. Mr. W. F. McGlone, 44 E. 23rd, New York 10, Sec.
American Neurological Association, Atlantic City, June 18-20, 1962. Dr. M. D. Yahr, 710 W. 168th, New York 32, Sec.
American Proctologic Society, Miami, Fla., April 30-May 3, 1962. Dr. N. D. Nigro, 7815 East Jefferson, Detroit 1, Sec.
American Public Health Association, Detroit, Nov. 13-17, 1961. Dr. B. F. Mattison, 1790 Broadway, New York 19, Exec. Sec.
American Society of Anesthesiologists, Los Angeles, Oct. 22-27, 1961. Mr. J. W. Andes, 515 Busse Highway, Park Ridge, Ill., Exec. Sec.
American Surgical Association. Dr. W. Altemeier, Cincinnati General Hospital, Cincinnati 29, Sec.
Association of American Physicians and Surgeons, Inc., Asheville, N. C., Oct. 12-14, 1961. Mr. H. E. Northam, 185 N. Wabash, Chicago 1, Exec. Dir.
International College of Surgeons, U. S. Chapter. Dr. R. T. McIntire, 1516 Lake Shore Dr., Chicago, Exec. Dir.
Radiological Society of North America, Chicago, Nov. 26-Dec. 1, 1961. Mr. M. D. Frazer, 3145 O Street, Lincoln, Neb., Sec.
South Central Association of Blood Banks, Fort Worth, 1962. L. R. Guy, Ph.D., 2927 Maple, Dallas 4, Sec.
Southern Medical Association, Dallas, Nov. 6-9, 1961. Mr. R. F. Butts, 2601 Highland, Birmingham 5, Exec. Sec.
Southern Psychiatric Association, New Orleans, Oct. 1-3, 1961. Dr. R. Proctor, Winston-Salem, N. C., Sec.
Southern Surgical Association, Hot Springs, Va., Dec. 5-7, 1961. Dr. J. D. Martin, Jr., Emory U., Atlanta 22, Ga., Sec.
Southwest Allergy Forum, Memphis, April 14-17, 1962. Dr. D. Goltmann, Lebenheur Children's Hospital, 848 Adams Avenue, Memphis, Tenn.
Southwestern Medical Association, Las Vegas, Oct. 19-21, 1961. Dr. M. Thomas, 1501 Arizona, El Paso, Sec.
Southwestern Society of Nuclear Medicine. Dr. J. R. Maxfield, Jr., 2711 Oak Lawn, Dallas, Sec.
Southwestern Surgical Congress, Albuquerque, N. Mex., April 2-5, 1962. Dr. R. B. Howard, 544 Pasteur Bldg., Oklahoma City 3, Okla.
Tri-State Medical Assembly. Dr. J. W. Wilson, Jr., 940 Margaret Place, Shreveport, Sec.
United States-Mexico Border Public Health Association. Dr. U. Blanco, El Paso, Sec.

State

Texas Academy of General Practice, Houston, Oct. 15-18, 1961. Mr. D. C. Jackson, 1905 N. Lamar, Austin, Exec. Sec.
Texas Academy of Internal Medicine, Houston, Dec. 2-3, 1961. Dr. S. C. Arnett, Jr., 2609 19th, Lubbock, Sec.
Texas Air-Medics Association, Austin, 1962. Dr. C. F. Miller, Box 1338, Waco, Sec.
Texas Association for Mental Health. Mrs. L. Marcus, 3525 Arrowhead, Dallas, Sec.
Texas Association of Obstetricians and Gynecologists, Dallas, February, 1962. Dr. H. W. Savage, 815 Fifth Ave., Ft. Worth, Sec.
Texas Association of Public Health Physicians. Dr. Elizabeth Gentry, 1313 Sabine, Austin, Sec.
Texas Chapter, American College of Chest Physicians, Austin, May 13, 1962. Dr. Donald L. Paulson, 3710 Swiss Ave., Dallas.
Texas Club of Internists. Dr. T. H. Harvill, Medical Arts Bldg., Dallas 1, Sec.
Texas Dermatological Society, Dallas, Nov. 5, 1961. Dr. D. S. Blair, 1609 Medical Arts Bldg., Dallas, Sec.
Texas Diabetes Association, Austin, May 13, 1962. Dr. John W. Chriss, 2436 Morgan, Corpus Christi, Sec.
Texas Division, American Cancer Society, Fort Worth, Dec. 7-8, 1961. Mr. C. W. Reimann, 5014 Bull Creek Rd., Austin 3, Exec. Sec.
Texas Industrial Medical Association, Austin, May 13, 1962. Dr. R. E. Joyner, Box 471, Texas City, Sec.
Texas Neuropsychiatric Association, Austin, May 12, 1962. Dr. E. I. Bruce, Jr., 1014 Strand, Galveston, Sec.
Texas Ophthalmological Association, Austin, May 14-15, 1962. Dr. Harold Hunt, 150 Eighth St., S.E., Paris, Sec.
Texas Orthopedic Association, Austin, May 14, 1962. Dr. Margaret Watkins, 3503 Fairmount, Dallas, Sec.
Texas Otolaryngological Association. Dr. Louis E. Adin, Jr., 3707 Gaston, Dallas, Sec.
Texas Physical Medicine and Rehabilitation Society. Dr. O. Selke, Medical Professional Bldg., Houston, Sec.
Texas Proctologic Society, San Antonio, Feb. 15, 1962. Dr. T. Melton, 636 Hermann Professional Bldg., Houston, Sec.
Texas Public Health Association, Houston, Feb. 11-14, 1962. J. N. Murphy, Jr., P. O. Box 5192, Austin 31, Sec.
Texas Radiological Society, Austin, Jan. 19-20, 1962. Dr. R. P. O'Bannon, 1217 W. Cannon, Ft. Worth, Sec.
Texas Rheumatism Association, Houston, Dec. 1, 1961. Dr. J. Kemper, 6655 Travis, Houston, Sec.
Texas Society of Anesthesiologists, Austin, May 12, 1962. Dr. E. L. Slataper, Medical Towers, Houston, Sec.
Texas Society of Athletic Team Physicians, Austin, April, 1962. Dr. L. Levy, Ft. Worth, Sec.
Texas Society on Aging, San Antonio, Dec. 1-2, 1961. Mrs. W. B. Ruggles, 3701 Stratford, Dallas, Sec.
Texas Society of Gastroenterologists and Proctologists, Austin, May, 1962. Dr. Belton Griffin, 6648 Fannin, Houston, Sec.
Texas Society of Ophthalmology and Otolaryngology. Dr. O. Suehs, 14 Medical Arts Square, Austin, Sec.
Texas Society of Pathologists, Inc., Galveston, last week of Jan., 1962. Dr. V. A. Stembridge, Southwestern Medical School, Dallas, Sec.
Texas Society of Plastic Surgeons. Dr. R. O. Brauer, 6615 Travis, Houston, Sec.
Texas Surgical Society, Waco., Oct. 1-3, 1961. Dr. G. V. Brindley, Jr., Scott and White Clinic, Temple, Sec.
Texas Traumatic Surgical Society, Austin, May 13, 1962. Dr. J. C. Long, 805 W. 8th, Plainview, Sec.
Texas Tuberculosis Association, El Paso, March 29-31, 1962. Mrs. J. R. Walton, Jr., 1407 Andrews Hwy., Midland, Sec.
Texas Urological Society, Houston, February, 1962. Dr. N. F. McDonald, 915 Medical Arts Bldg., Houston 15, Sec.

District

First District Society, Pecos, February, 1962. Dr. G. L. Black, 1501 Arizona, El Paso, Sec.
Second District Society. Dr. W. S. Parks, Jr., 2009 W. Wall, Midland, Sec.
Third District Society, Pampa, Sept., 1962. Dr. H. F. Johnson, 2308 W. 8th, Amarillo, Sec.
Fifth and Sixth Districts Society. Dr. S. H. Ware, Jr., 3154 Reid Drive, Corpus Christi, Sec.
Seventh District Society. Dr. R. Lucas, 502 W. 13th, Austin, Sec.
Eighth District Society. Dr. H. Davis, 120 Barracuda, Galveston, Sec.
Ninth District Society.
Tenth District Society. Dr. I. M. Richman, 3280 Fannin, Beaumont, Sec.
Eleventh District Society. Tyler, Spring, 1962. Dr. F. Verheyden, 400 S. Ragsdale, Jacksonville, Sec.
Twelfth District Society, Temple, Jan. 13, 1962. Dr. J. Dunlap, 2320 Columbus, Waco, Sec.
Thirteenth District Society. Dr. R. D. Moreton, 1217 W. Cannon, Ft. Worth, Sec.
Fourteenth District Society.
Fifteenth District Society. Dr. J. S. Leeves, Naples, Sec.

Clinics

Blackford Memorial Cancer Lectures, Denison, Nov. 2, 1961. Dr. A. O. Jensen, Suite N-1, Medical Center, Denison, Chm.
Dallas Southern Clinical Society Conference, Dallas, March 19-21, 1962. Dr. C. M. Cole, 1421 Medical Arts Bldg., Dallas, Sec.
International Medical Assembly of Southwest Texas, San Antonio, Jan. 29-31, 1962. S. E. Cockrell, Jr., 202 W. French Place, San Antonio, Exec. Sec.
New Orleans Graduate Medical Assembly, New Orleans, March 12-15, 1962. Dr. Mannie D. Paine, Jr., 1430 Tulane Ave., New Orleans 12, Exec. Sec.
North Texas-Southern Oklahoma Fall Clinical Conference. Dr. F. J. Lee, 1300 8th, Wichita Falls, Chm.
Oklahoma City Clinical Conference, Oklahoma City, Oct. 23-25, 1961. Miss Alma F. O'Donnell, 503 Medical Arts Bldg., Oklahoma City 2, Exec. Sec.
Postgraduate Medical Assembly of South Texas. Mrs. W. H. Dahme, 412 Jesse H. Jones Library Bldg., Houston 25, Exec. Sec.
Private Clinics and Hospitals, Houston, Dec. 2-3, 1961. Mr. B. J. Warren, Deaton Hospital, Galena Park, Sec.

Board Examinations

Texas State Board of Examiners in Basic Sciences, Austin, Mid-October, 1961. Mrs. Maria P. Hathaway, Exec. Sec., 1012 State Office Bldg., Austin.